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DAVIS, EDWARD P., M.D.

EWART, WILLIAM, M.D., F.R.C.P.

GOTTHEIL, WILLIAM S., M.D.

SPILLER, WILLIAM G., M.D.

PUBLISHED QUARTERLY

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LEA & FEBIGER

708 Sansom Street

PHILADELPHIA

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Awarded Grand Prize, Paris Exposition, 1900

PROGRESSIVE MEDICINE

A QUARTERLY DIGEST OF ADVANCES, DISCOVERIES
AND IMPROVEMENTS

IN THE

MEDICAL AND SURGICAL SCIENCES

EDITED BY

HOBART AMORY HARE, M.D.

PROFESSOR OF THERAPEUTICS AND DIAGNOSIS IN THE JEFFERSON MEDICAL COLLEGE OF PHILADELPHIA;
PHYSICIAN TO THE JEFFERSON MEDICAL COLLEGE HOSPITAL; ONE TIME CLINICAL PROFESSOR
OF DISEASES OF CHILDREN IN THE UNIVERSITY OF PENNSYLVANIA; MEMBER
OF THE ASSOCIATION OF AMERICAN PHYSICIANS, ETC.

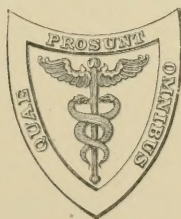
ASSISTED BY

LEIGHTON F. APPLEMAN, M.D.

INSTRUCTOR IN THERAPEUTICS, JEFFERSON MEDICAL COLLEGE, PHILADELPHIA; OPHTHALMOLOGIST TO
THE FREDERICK DOUGLASS MEMORIAL HOSPITAL; INSTRUCTOR IN OPHTHALMOLOGY, PHILA-
DELPHIA POLYCLINIC HOSPITAL AND COLLEGE FOR GRADUATES IN MEDICINE.


VOLUME III. SEPTEMBER, 1913

DISEASES OF THE THORAX AND ITS VISCERA, INCLUDING THE HEART, LUNGS
AND BLOODVESSELS—DERMATOLOGY AND SYPHILIS—OBSTETRICS—
DISEASES OF THE NERVOUS SYSTEM.



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LIST OF CONTRIBUTORS

JOSEPH C. BLOODGOOD, M.D.,

Associate Professor of Surgery, Johns Hopkins University, Baltimore, Md.

CHARLES W. BONNEY, M.D.,

Assistant Demonstrator of Anatomy in the Jefferson Medical College, Philadelphia.

JOHN ROSE BRADFORD, M.D., F.R.C.P., F.R.S.,

Professor of Medicine in University College and Physician to the University College Hospital, London.

JOHN G. CLARK, M.D.,

Professor of Gynecology in the University of Pennsylvania, Philadelphia.

WILLIAM B. COLEY, M.D.,

Professor of Clinical Surgery, Cornell University Medical School; Attending Surgeon to the General Memorial Hospital; Attending Surgeon to the Hospital for Ruptured and Crippled.

FLOYD M. CRANDALL, M.D.,

Consulting Physician to the Infants' and Children's Hospital; Late Visiting Physician to Minturn Hospital, New York.

EDWARD P. DAVIS, M.D.,

Professor of Obstetrics in the Jefferson Medical College of Philadelphia.

ARTHUR B. DUEL, M.D.,

Professor of Otolaryngology, New York Polyclinic Medical School and Hospital; Aural Surgeon to the Manhattan Eye, Ear, and Throat Hospital, and to the Polyclinic Hospital; Otolaryngologist to the Babies' Hospital; Consulting Aural Surgeon to the Skin and Cancer Hospital, and to the New York Health Board Hospitals.

WILLIAM EWART, M.D., F.R.C.P.,

Consulting Physician to St. George's Hospital and to the Belgrave Hospital for Children, London.

CHARLES H. FRAZIER, M.D.,

Professor of Clinical Surgery in the University of Pennsylvania; Surgeon to the University, Howard, and Philadelphia Hospitals.

JOHN C. A. GERSTER, M.D.,

Instructor in Surgery, New York Polyclinic Hospital and Medical School;
Attending Surgeon to the University and Bellevue Hospital Medical School's
Clinic; Assistant Attending Surgeon to the City Hospital (Blackwell's
Island).

EDWARD H. GOODMAN, M.D.,

Associate in Medicine, University of Pennsylvania; Assistant Physician,
University Hospital and Philadelphia General Hospital; Consultant to
the Medical Dispensary, University Hospital.

WILLIAM S. GOTTHEIL, M.D.,

Adjunct Professor of Dermatology, New York Post-Graduate Medical School;
Consulting Dermatologist to Beth Israel and Washington Heights Hospitals;
Visiting Dermatologist to the City and Lebanon Hospitals, New York City.

EDWARD JACKSON, M.D.,

Professor of Ophthalmology in the University of Colorado; Ophthalmologist
to the City and County Hospital of Denver.

H. R. M. LANDIS, M.D.,

Director of the Clinical Department of the Phipps Institute of the Univer-
sity of Pennsylvania; Associate in Medicine, University of Pennsylvania;
Visiting Physician to the White Haven Sanatorium.

JOHN RUHRÄH, M.D.,

Professor of Diseases of Children and Therapeutics, College of Physicians
and Surgeons; Visiting Physician, Robert Garrett Hospital, Nursery and
Child's Hospital, Mercy Hospital; Consulting Physician, Church Home
and Infirmary, Baltimore.

WILLIAM G. SPILLER, M.D.,

Professor of Neuropathology and Associate Professor of Neurology in the
University of Pennsylvania; Clinical Professor of Nervous Diseases in the
Woman's Medical College of Pennsylvania.

ALFRED STENGEL, M.D.,

Professor of the Theory and Practice of Medicine and Clinical Medicine in
the University of Pennsylvania, Philadelphia.

GEORGE B. WOOD, M.D.,

Surgeon to the Department of the Nose, Throat, and Ear, Howard Hospital;
Assistant Laryngologist, Orthopædic Hospital.

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PROGRESSIVE MEDICINE

SEPTEMBER, 1913

DISEASES OF THE THORAX AND ITS VISCERA, INCLUDING THE HEART, LUNGS, AND BLOODVESSELS

BY WILLIAM EWART, M.D., F.R.C.P.

PULMONARY TUBERCULOSIS

To the reader some explanation is due for the large space allotted to this subject. It is simply this: In the past, our relative neglect of the most important of studies in previous Reports, and now the unequalled degree in which this year declares that study opportune. In the medical annals of the English-speaking world, 1913 will stand as historical and fateful, in connection with the tuberculosis responsibilities assumed and subvented by the State in Great Britain, and with the novel pressure brought to bear upon our own technical responsibilities toward the problems of practical pathology and treatment. Public opinion too is aroused to the fact that those problems are too slow to mature. The great rush after "Friedmann" advertises its consciousness of the fact that some adequate cure has yet to be found, a fact long patent to us in the acknowledged inadequacy of simple sanatorium treatment, and in the inconclusive diversity of methods and of their critical estimates at the hands of experts in our bacillotherapy; for that remains so far the only other string to our bow. In those problems the State is now a Budget-interested partner; henceforth our judge, as well as paymaster and taskmaster, it bids us hurry up our reserves. The soul of this novel situation might be expressed by paraphrasing the famous rhyme:

De par la loi défense à Dieu
De faire miracles en ce lieu.

That "Phthisis cured" become a fact
The House by law doth now enact.

We may no longer discuss our old problems of diagnosis, pathology, and, above all, treatment in serene and leisurely aloofness. We are now urged to make haste with our pathology, which still hangs fire, and with our therapy, which still limps, inglorious, in the rear.

In sober earnest, 1913 draws a line across the great Kochian era—not of arrest, for everything points to its progress and perhaps to the ultimate success of its phenomenal labors—but rather of survey, as to whether tuberculin being good is yet good enough, and being so slow it might not be applied earlier and more widely, under safeguards, perhaps, after all from drugs, although we have long discarded not only cod-liver oil but the entire pharmacopœia, or possibly from hormones, against the risks which still restrain our experts from administering it before the disease has progressed to obvious symptoms of beginning destruction.

Meanwhile the surgical era has broken upon us, with its short-cuts to results, with its rapid methods, if not always rapid cures, in lofty disregard for any let or hindrance from the bacillus. Outside all bacillotherapy, independent even of sanatorial “open air,” artificial pneumothorax has now scored the first of all our victories which no sceptic dare attribute to all-healing Nature, but must credit to our healing art; it teaches us that there is a cure elsewhere, and that its nature is mechanical.

Mora Medendi. That is our trouble. Have we tarried perhaps too long over microchemical, as once over microscopic natural history, ambitious for Nature’s own finest levers, rather than content to handle the simple ones she specially reserves for our common use? Our one hopeful remedy, tuberculin, is too slow. We have discarded for a time the entire pharmacopœia; and we reluctantly realize our inability to “salt the tail” of the elusive bacillus even by well-meant antiseptic inhalations; or ever to stamp out phthisis by Act of Parliament, like rabies, by a universal muzzling order. All our other “radical cures” have collapsed in the attempt. That long vigil of our therapeutics under the sign of the bacillus has been the making of our bacteriology. It presents us this year with its first unquestioned practical success, an increased rate of clearance of the bacillus from the sputum. But we have waited too long for the greater manifestations of the oracle.

While our augurs are still deep in study, eviscerating the bacillus, once again we must incur the reproach of giving no space to the technical details of the tuberculin progress, beyond a summing up of the latest attitude of its votaries and opponents which calls for an authoritative jury to decide between facts and opinions. We must turn to the more urgent study of the more practical teaching of modern phthisis—surgery, and of the old method of Carson and of Forlanini which is the compendium of the cure and of its mechanism. Our present endeavor is to isolate its working principles from its dangerous pro-

cedure for universal safe application to the earliest stages, and before; and perhaps to do away for the future with all heroic measures. The practical details could only be elaborated by a wide coöperation of the State with our clinical workers. For our own part we must fall back for that study upon our most effective working coalition, that of our medical schools, of our special hospitals, of our hospital-sanatoria, and of our dispensaries. The work henceforth can be carried out on business lines. The State is ready with its treasure if we will but name the genuine cure. But let us above all concentrate upon "prevention." The State has provided us with the working means; let us turn to full account its schools and its medical inspectors.

A recent suggestion was made in connection with the appendix for a universal routine examination for soundness as part of every clinical overhauling, and *à fortiori* at the school. Phthisis is a much wider urgency. At Ilford, in April, 1909, I suggested a tuberculosis census and a certificate of soundness.

Difficult still for the entire population, these proposals are now feasible for our school population. Why not be thorough? Nature teaches us that some are immune while others are not. When we have learned her lessons, both in physiological and in pathological immunity, let us have an "immunity certificate," and concentrate our closer watch upon the uncertifiable, with a view to their preventive treatment. Nature's second lesson is that the bacillus attacks the apex. Why not concentrate our preventive means upon the "apices," and in good early time? This brings up the apex problem. It needs much more than individual endeavor; that is the chief excuse for burdening PROGRESSIVE MEDICINE with its lengthy presentment.

Drugs have been ruled out, we are left with only two *medical* forms of treatment, the non-specific, general hygienic treatment of the sanatorium, and the specific treatment by tuberculin. Practically, tuberculin is a non-mechanical; the sanatorium, as we shall endeavor to show, a mechanical treatment. Meanwhile, the *surgical* tale of purely mechanical, non-specific, treatment, and with its brilliant heroic cures—from MacEwen down to Wilms, is one of resourceful endeavor. Our "Carson," or "Forlanini," with a minimum of surgery teaches us all that which we have neglected. As a demonstration of the un hoped-for cure and of its secrets, it is our basis for study. Its lessons are purely mechanical: "physiological rest, and physiological exercise,"—by no means new as such, but never before applied in an absolute degree, and never before to the spot. They are in two words "unilateral compression" and "unilateral breathing." These are the essence of the mechanical treatment we have to suggest for elaboration by those better favored with clinical opportunities. The usefulness of the heroic measures necessitated by the advanced stages will last as long as phthisis remains unchecked in its early progress. To check

the disease in good time must be the main purpose of our future therapy; and the early mechanical helps thereto are our best promise. Their chief scope is prevention; their pattern the respiratory apex-benefits attaching to the immunizing affections; and their practical methods are those we venture to describe under the names of "Apex Orthopedics" and "Spinal Culture."

Bacteriology. ANAPHYLAXIS AND TEMPERAMENT. Anaphylaxis has been in the air for the last three years as a quintessence from the simmering of the cauldron. It has at last emerged, like the Arabian cloud, into a visible, all-pervading presence, as "the ultra" of our vital reflexes, binding into a homogeneous whole the subtle interactions of the reciprocating systems successively revealed to our analysis of life, such as the neuro-hormonic system, and the enzyme-hormonic system. According to J. Galup,¹ "diathesis" is largely an anaphylactic state of the organism. Its reactions, like those of immunity, are defensive, and they produce, together with the latter, the special abnormal features known under that name, as, for instance, in "lymphatism" a term which he prefers to that of "scrofula," and in "arthritis," the "exudative diathesis" of the Germans. In arthritis, with chiefly metabolic complications of life-long duration, he perceives simple anaphylactic reactions only. In lymphatism, limited to youth, the reactions of immunity are associated with those of anaphylaxis (the latter being either localized or general); and the complications are chiefly those of secondary infections. Eventually, if complete immunization should fail, generalized tuberculosis may follow; if it should succeed, anaphylaxis alone prevails, and the individual develops arthritis.

Active and Passive Hypersensitiveness to Tubercle Bacilli. An important contribution to the inquiry into the varying degrees of sensitiveness to the onslaught of the tubercle bacillus, as shown by experiment on animals, and into their relation to the tuberculin reaction in man, recently published in the *Zeitschrift f. Immunitätsforschung und Exp. Therapie* by Thiele and Embleton of University College, London, is reported in the *British Medical Journal* (vol. i, p. 575): "Beginning with the production of hypersensitiveness in the guinea-pig by the inoculation of a sterilized emulsion of tubercle bacilli and afterward by the introduction of isogenous and heterogenous tissues, they have tested their animals in every case for the anaphylactic shock, the temperature reaction, and for any cutaneous changes that might be expected to occur on further inoculation with active B. E. These changes, in regard to general symptoms and pathological appearances, were sufficiently uniform to permit of a typical standard being set up. These experiments are held to prove that hypersensitiveness to tubercle can be produced in the guinea-pig by injection of finely divided bacilli or by the inoculation of blood from an acutely hypersensitive

¹ Presse Méd., April 19, 1913.

guinea-pig or highly sensitive human patient. Tuberculous tissue when inoculated produced similar symptoms, but many such tissues contained antibodies as well as bacilli. It is further claimed that the reacting antibody which calls forth fever, etc., with tuberculin in the tuberculous patient, is identical with that which causes anaphylaxis and temperature changes in guinea-pigs which have been rendered hypersensitive. Hypersensitiveness to tubercle in the human subject has been generally regarded, when produced artificially, as being due to the use of too large a dose, but it had been assumed, as it seems without sufficient warrant, that the injection of tuberculin is powerless to produce sensitiveness in animals."

Hypersensitiveness to Tuberculo-protein and Tuberculin. Austrian's¹ experiments which confirm the already demonstrated facts that (1) a protein substance can be obtained by the extraction of tubercle bacilli with water, and with it animals can be actively sensitized, (2) that a refractory condition to this protein can be produced, and (3) that the hypersensitive condition is transmitted from mother to young, establish further that active sensitization induced by treatment with this protein may be as regular and as intense as that from other proteins. The material transmission of the hypersensitiveness does not take place through the milk. All the typical manifestations can be produced in guinea-pigs by aqueous extracts of tubercle bacilli, by albumose-free tuberculin, and by old tuberculin freed of glycerin and made poor in salts. Sensitization with any of them causes reaction to the injection of the others.

Hypersensitiveness to tuberculin develops within seven to fifteen days after infection with the B. tuberculosis. Tuberculous animals can occasionally be intoxicated with tuberculo-protein, developing symptoms of hypersensitiveness. A passive transference of hypersensitiveness from a tuberculous man to normal guinea-pigs was also obtained by him. Likewise when the serum of a sensitized animal has been injected into an untreated one. Austrian infers from his evidence that the tuberculin reaction is a manifestation of true hypersensitiveness.

Congenital Transmission. F. Harbitz² publishes a case to add to the 20 "undoubted" cases in the existing list of 120 cases hitherto on record. The mother had a tubercular lesion of the uterus at the site of placental implantation.

Bacilli in the Blood. H. Dressen³ examined the blood in 31 cases of undoubted tubercle, in 9 suspected cases, and in 30 cases free from any signs. He found bacilli in 74 per cent. of the first, 55 per cent. of the second, and 46 per cent. of the third group—in all, 60 per cent. of the total 70 cases examined. Yet there was only one instance of infection in the series of 128 animals inoculated from them.

¹ Bulletin of Johns Hopkins Hospital, May, 1913, xxiv.

² Münch. med. Woch., April 8, 1913.

³ Med. Klinik, April 13, 1913

Poncet's Inflammatory Articular Tuberculosis was recognized by F. v. Gebhardt,¹ and confirmed by subsequent pulmonary developments, in 3 early adults (in 1 of them under "tuberculin-mobilization" of a local cutaneous tuberculosis of the hand). Another of these "tubercular-rheumatism" cases eventuated in a polysynovitis, which was identified as bacillary by testing the synovial fluid on guinea-pigs.

The Pathology of Consumption. Its Prevention and Curability; and their Mechanical Factor. I. THE PREVENTION OF CONSUMPTION has three degrees: (1) The prevention of tuberculosis; (2) the prevention of apex tuberculosis; and (3) the prevention of phthisis. A "general protection" against all tuberculosis, analogous to that of vaccinia against smallpox, has yet to be discovered for man. While some "pulmonary protection" is now assumed to be conveyed by auto-inoculation from any primary tubercular foci elsewhere (the pulmonary immunity in scrofula [Treves] is possibly an instance in point), no attempt has hitherto been made at a "local immunization" of the apex. Lastly, the "prevention of phthisis" resolves itself in a timely suppression of the early apex-tuberculosis, while still free from complicating catarrh. But when tubercle is grafted upon an antecedent or initial pneumonia, phthisis cannot be prevented, it might only be cured.

II. THE CURABILITY OF CONSUMPTION is of modern demonstration. It is capable of arrest—why not then arrested? "*Pure*" *pulmonary tuberculosis* seldom kills; but then it kills quickly. In its prevalent subacute apical form, it neither kills nor is actively cured; it most often limits and cures itself. Our galloping, bacillemic, primary "pulmonary granulie" (of which there is also a late form) is alone incurable. Short of a continuous transfusion to supply an entirely new blood charged with fresh phagocytes, there is no imaginable remedy for it.

"*Chronic*" *Phthisis* is no longer to be despaired of. The spontaneous cure of "early" phthisis, though less common than those of pure tubercle, made the reputation of many drugs before Bodington in spite of closed windows, and also that of the open air since he opened them. But neither open air nor tuberculin can undertake the cure of the worst types. Their curability by Carson's method has come to us as a revelation.

The Mechanical Treatment and Artificial Pneumothorax. The treatment we have to suggest by no means excludes the modern bacillary treatment which hitherto has worked solely under the formula, "The soil, the seed, and their variations," but merely adds to this its own working formula "the machine and its Constants." In all our future successes and failures under that desirable coöperation, "the soil," which is the chief care of our bacillotherapy, will ever remain the decisive factor. But Nature, all the way back, in her minor and in her

¹ Beiträge, 1913, xxvi.

major cures, has been carrying on the mechanical treatment quite independently of our "soil cultivation," and has established its higher remedial claims. Her "minor" cures are of every-day occurrence—those of latent or unsuspected apex disease. Her "major" cures are brilliant but rare: the cures of incurable, progressive phthisis by spontaneous pneumothorax. We are now copying the latter; why not copy the former also, to largely restrict the perhaps never completely suppressible operation of the fatal "soil" clause? It was imitated by Bodington, and others before him, but its full edition is only to be read in induced pneumothorax, our great compendium of the cure and of its mechanical method. For our present endeavor to improve upon his method, we need no better standard or warrant. But, in view of momentous responsibilities of the hour, any large innovation should be justified by the broadest support, which we propose to seek in the separate teachings of anatomy and physiology, of pathology, of hygiene, of diagnosis and prognosis, and of treatment.

The therapeutics of tuberculosis fall under the two headings, specific and non-specific; and, for practice, into three divisions: (1) The specific or immunizing, (2) the trophic or raising, and (3) the varied mechanical methods. The best results belong to their combination, and much of our treatment is therefore frankly medico-surgical. "Medical treatment" might be regarded as comprising the immunizing method and the trophic; but the latter includes much that wears a surgical complexion. Again, "surgical treatment" comprises our operative, and our non-operative surgery; but the latter, as for instance Rollier's heliotherapy for spinal abscess or empyema, is largely pure medical hygiene. There is no longer any dividing line. The mainly medical contribution is the specific treatment, the mainly surgical contribution the non-specific operative treatment. As this is now in the ascendant, and as all surgery is mechanical, there is no need for us to insist upon the importance of the mechanical factor, and this should claim an increasing place in our physicians' prescriptions. All the "operative" cures are manifestly mechanical; but none of them perhaps more so than artificial pneumothorax, though this is hardly an "operation," and is commonly physicians' work. To relieve space, we may indicate in tabular form the contrast between our medical inertia, simply expressed in two words "sanatorium" and "tuberculin," and the remarkable activity in the mechanical doings of surgery.

The Mechanical Factor in Surgical Treatment. (1) "All surgery is mechanical," whether operative or non-operative. (2) All operative surgery is antiseptic; but none of it (apart from specific injection treatment) is specific in its antiseptis; though it may soon, perhaps, develop a specific branch in the direction of a local tissue-implantation of "destroyers," say for cancer, or similar local affections. (3) Phthisis-

surgery, hitherto, is entirely non-specific and "extrabacillary" in its aim and procedure.

The present situation, then, is easily summed up: (1) Surgery has stepped to the front, with its varied attempts, and with its successful achievements. The first genuine cure not ascribable to the forces of nature which was ever proposed, and the only one which has hitherto been realized, is the surgical cure of Carson and of Forlanini. (2) The mechanical principle is therefore actually predominant in efficiency, and the only one hitherto claiming complete success in the result. (3) The preventive phthisis surgery of Freund addresses itself to the prevention of apex-tuberculosis. It has unfortunately not yet been elaborated into suitable lines for general adoption. (4) Curative phthisis surgery, on the contrary, has assumed surprising extension. It addresses itself not to the stage of pure apex-tuberculosis, but exclusively to the advanced stages of phthisis. (5) The growth of its activities is surprisingly rapid. Since last year's edition of Garré and Quincke's "Lungenchirurgie," which contains its most complete survey, further advances have to be registered, and in particular Schepelmann's ingenious experimental "diaphragmatic" and "phrenic nerve-division" methods, which substitute a "visceral" compression of the lung for Carson's gaseous one; and d'Amico's local intrapulmonary injections of iodized or iodoformized antiseptic fluids; besides others of minor importance. The chief of those remarkable surgical developments are appended in tabular form to this brief historical comment.

SURGERY

I. Preventive surgery: Freund's linear chondrotomy.

II. Phthisis surgery	Thoracic	Chondral.
		Costal.
	Pleural	Plastic
		Injectational.
	Pulmonary	Amputation.
		Compression.
	Vascular	: Atelectasis by ligature.
	Bronchial	: Drainage.

SURGICAL PROCEDURES

		Window or flap.
Thoracic reduction	{	Wholesale resection.
		Local resections.
		Window or flap.
		Mobilized segment (Wilms).
"Thoracic" pulmonary compression:		
"Pleural" pulmonary compression, viz.:		
		Gaseous (Carson, 1821; Forlanini, 1882).
		"Folded lung" compression (Garre).
(a) Intrapleural	{	Artificial "paralysis" of diaphragm (phrenic nerve).
	{	Artificial "hernia" of diaphragm.
	{	By decortication.
(b) Extrapleural		By plastic prosthesis.
		By pressure of ingrafted tissue (lipoma, Tuffiër).
Pulmonary amputation :		Macewen.
Pulmonary artery ligature :		Sauerbruch-Schumacher.

MEDICOSURGICAL METHODS BY INJECTIONS

1. General	{	Subcutaneous	{	Specific and hormonal	{	Tuberculin.	
		Intravenous		Non-specific, antiseptic, or hormonal		Vaccines.	
2. Local	{	Intrabronchial	: Colin (Campbell)			Formalin,	
		Intrapulmonary	: Iodoform (D'Amico).			Silver,	
3. Subcutaneous	:	Oxygen (Bayeux)				Iodoform.	
						Cinnamates, etc.	

THE "RADICAL" CURES

Tuberculins and vaccines.
 Friedmann's turtle bacillus.
 Continuous inhalations.
 Allyl sulphide Inunctions.
 Lysol injections.

Intravenous medication	{	Antiseptics	{	Formalin,
		Iodoform		Collargol, etc.
Intrapulmonary injections	{	Cinnamates, etc.	{	Iodized serum,
		Iodoform, etc.		Iodoform, etc.
Quack remedies	:	No end.		

ELEMENTARY PATHOLOGY. *Tuberculosis and Phthisis.* The first is a generic, pathological term; the second a distinctive, clinical one. Our daily usage of "pulmonary tuberculosis" generally refers to the original apex infection; Niemeyer meant the secondary. We can gain nothing from that generic designation, except by exclusively reserving it for the unit, "pure tuberculosis," which it clearly describes. Our clinical business is with the other. "Phthisis" is our truly explicit and indispensable specification, around which the clinical question pivots entirely, and which justifies its distinct status to bacteriology by its mixed infections, and to clinical pathology by its distinctive lesions and symptoms.

Of Niemeyer's "late tuberculosis" there are two kinds: terminal sporadic miliary tuberculosis strictly *blood infective*; and focal miliary tuberculosis, from contact gravitation, and inhalation down the bronchi, mainly *mechanical-infective*; and familiar to us as Carswell's "grapes." In the chronic cases, the onset of phthisis is our worst disaster. Niemeyer's opposite dictum had obscured the issue, and unfortunately has led to a retrograde reform in our nomenclature. The exclusive use of the term "pulmonary tuberculosis" has taught us nothing but to forget the main point. The accompanying table of the main varieties may at once clear up the confusion, which has been of our own making.

TUBERCULOSIS PULMONALIS AND PHTHISIS PULMONALIS

I. Primary pure	{	A. Primary bacillemia, acute miliary. B. Local subacute apex tuberculosis. Tuberculosis + Sepsis and Softening.
II. Phthisis	{	Bronchial Pulmonary } Mixed infections. A. Secondary bacillemia, acute miliary. B. Secondary local, mechanical, viz.:
III. Secondary mixed (Niemeier)	{	1. Spreading-infective by { Surface contact. Deep tissue-contact. Continuity. Gravitation. Inhalation (Carswell's grapes). 2. Bronchial-infective by

The Apex Question in Anatomy and Physiology. Human phthisis is practically an apex-question—"no apex disease, no phthisis"—much to our disadvantage in the comparative liability of the race, but greatly to our advantage in our own individual curability. "Why the apex always" is a mystery, which is only surpassed by the two mysterious facts that disease attacks only one apex at first, and that it attacks the right practically as often as the left, though some say rather more frequently. These facts are alike exclusive of a unilateral "structural" and of a unilateral "infective" causation. Comparative anatomy supplies the most obvious differential evidence in the upper thoracic results of our erect station; and that evidence is borne out by Freund's anatomy of the phthisinoid chest, with its shorter first cartilage, and its more sloping and therefore narrower upper inlet. Rokitsansky does not help us much with his vascular "mitral" theory. The most plausible view is the current strictly mechanical view that the apex is the seat of an inferior ventilating function, shall we add of a "vicarious" ventilation. The other side of the question is the physiological advantage of the remainder of our human lung, and the probably immunizing efficiency of its powerful "direct" ventilation.

The Function of the Apex is that of the lung as a whole: Its scheme essentially that of a cardiac blood and lymph pump working inside a thoracic and pulmonary air pump. This contains our solution. Whether deposited from blood or air, our protection against the bacilli is in proportion to the efficiency of the pumping, and particularly of the "pumping out," mainly an expiratory question. If so, we might conclude *à priori* that it must be highly efficient in the lung and much less so at the apex; and this is borne out by anatomy. For skeletal reasons the ventilation of the apex, its chief bulk nested posteriorly in a rigid costal "niche"—is largely vicarious rather than direct, and administered to it by the powerful bronchial draughts set up in more active respiratory planes. The trouble is not want of air, even at the apex there is plenty and to spare, but want of mobility, which would be absolute, as it tends to be in the pretubercular stage, but for the

feeble inspiratory rise to be secured by forcible breathing. The mischief is that, as no effort can produce an expiratory collapse of the niche beyond that minimum, the local expiratory blood and lymph—pumping is permanently at a disadvantage, not being so easily replaced vicariously as the local inspiratory air-pumping. The result is that, despite their being fewer, the imported bacilli cannot be so quickly dislodged and carried to the scavenging glands. This is the local danger, and also the therapeutic difficulty, not met by mere sanatorial routine, to which we should turn more active attention. Tuberculin can mend it perhaps; but to avert it we should combat it on its own lines which are mechanical, both for prevention and for cure.

Freund's Work as Anatomist and Surgeon. When function has fashioned structure, our anatomy rules out physiology. Man's leading feature *erectus ad sidera* governs every detail in him from the apex to the appendix, including thorax and diaphragm; if it contains the prime cause, it should be first consulted for the cure. Quincke's excellent review, in "Die Lungenchirurgie," of Freund's work, does not take us quite the whole way. The apex question is a spinal question.

Freund's anatomy recognizes basal facts in the apex limitations. The limitation in space is its mainly dorsal situation in the rigid costal dome, farthest from the least rigid sternal bearings. The limitation in movement is that of the attachments of the first rib. It is intensified by any costovertebral ankylosis, and by chondral shortness or acquired fibrosis and calcification. It is diminished by chondral elongation and by increased costovertebral articular range, such as that in chronic emphysema, and by any chondrosternal false joint such as is often developed in healed chronic phthisis.

Freund's pathological anatomy cannot be discussed here in detail. Enough that the late mechanical results of emphysema point to the early mechanical cure for the phthinoid chest, just as the phthinoid chest points to the early preventive mechanical cure for emphysema.

Freund's surgery is not wholly free from criticism. Though linear chondrotomy is his identical remedy for two opposite morbid mechanisms, he has suggested it as the "late cure" for the extreme respiratory dead lock of emphysema, which it immediately relieves, and, on the other hand, as an "early preventive" for the risks of the phthinoid chest. Nevertheless the facts remain (1) that the phthisis danger lies in the dorsal rigidity, an indication which has at last recently been met by Wilms' posterior costal mobilization, and (2) that, as Quincke aptly points out, it is in vain to favor inspiratory range if we cripple the elastic chondral tension, and torsion, which are the only expiratory mechanism of the first rib. The remedy should be not to divide, but, if possible, to elongate and mobilize the cartilage.

The Route of Apex Infection. For this we assume two channels; down the bronchi, and along the vessels. It is difficult even for a dog

to snap up a single tuberculous fly on the wing; but he could easily swallow a bunch of them off the fly-rest. This is probably true of the human apex. Few indeed are the bacilli it can catch from the air; but endless relays of those swallowed can be irrigated into it from the blood. While bacillemic infection is an undoubted fact, and by far the most probable vehicle, the "air-route," which has been the main anxiety of all our hygiene, is difficult to prove in man. Bacmeister's experiments in rabbits published quite recently this year, are most suggestive. Having mechanically interfered with the growth of the apex so as to render it vulnerable instead of immune as in all quadrupeds, at the same time also inducing the appearance of Schmorl's "pressure-groove," which is special to our own infantile apex, he was able to infect only the apex, by subcutaneous and intravenous attenuated injections of tubercle; but he failed to infect either lung or apex by moist or by dry powdered tubercle inhaled into the bronchi.

The fact is that, whether inhaled or floated, "the supply" of bacilli is much less abundant at the apex than at any other districts, by reason of its smaller bulk and feebler air currents. The conclusion is obvious that the apex is a mechanical trap, easy of ingress, but difficult to escape from. We are reminded by Æsop in his fable about the two bitches of "possession being nine points of the law, and increase of the population the secret of war power." The only alternative, scarcely debatable, is the assumption at the apex of some selective tissue property or some local advantage for culture. Strangely the latter hypothesis has been based upon mechanical reasons of gravitation by the latest students of the question.

Fat and the Apical Localization of Tubercle. W. C. White and H. M. Gammon's¹ difficult if plausible thesis, "The Relation of Animal Fat to Tubercle Bacillus Fat," suggests that, owing to the relatively slow blood-stream in the main divisions of the pulmonary artery, the abundant fatty derivatives conveyed from the liver have time to rise, owing to their low specific gravity, to the upper part of the blood column, and are for that reason more freely served to the apex than to any other part, and that, as shown by their artificial cultures, any bacilli settling there would thrive upon that rich diet. Their ingenious theory is based bacteriologically upon the preferential local "culture" rather than upon any "tissue" conditions and upon the "nutritive" advantages offered to the bacillary growth by a fatty blood; but it is also based, mechanically, upon the assumption of a slow blood-stream in the pulmonary artery giving time for the rich fatty contingent from the liver to rise like a cream to the higher arterial level of the apex distribution, as a favored pabulum for the apex dwellers.

The Mechanical Factor in Health, in Disease, and in Immunity. APEX VULNERABILITY AND PULMONARY IMMUNITY. *Pathology* brings us into

¹ Journal of Medical Research, June, 1912.

touch with the problems of unilateral breathing, as the onset of pulmonary disease is almost invariably unilateral; but it is most instructive in the collateral field of our immunizing affections against pulmonary tuberculosis.

The greatest achievement of our bacteriology has been the demonstration of artificial "immunization" against infection, as a guide to its "cure" by artificial infection. All forms of immunization against phthisis might, of course, be attributed to that mechanism. Any of our bacterial varieties, such, for instance, as the intestinal flora of Rickets, might be credited with immunizing powers, and perhaps rightly so. Let that be a ruling reservation, and possibly a practical help. But that "immunizing" theory does not fully explain the strange localization of pulmonary infection. That is our excuse for studying independently the mechanical aspect.

The bacilleamia of acute miliary tuberculosis has first to be dismissed as a special case. In that the predominating implication of the lungs, and the evenness in the distribution of the tubercles, are explained partly by the smaller size of their capillaries, but chiefly by the fact that they are the only organs in the body which receive the entire bulk of each successive systole. This does not explain all the facts in the form of infection which is postulated to be of air-borne derivation. Why does tuberculosis invariably concentrate upon the apex? The cause is most probably mechanical rather than connected with any local selective infectivity. Indeed, as we have hinted, even the bacteriological explanations are partly mechanical. The nearest approach to a proof of the mechanical hypothesis is that supplied by Bacmeister's¹ artificial growth-arrest of the pulmonary apex in rabbits.

The Physiological Vulnerability of the Human Apex, and the Physiological Immunity of the Rest of the Lung. These are merely novel aspects of the old bacillary question. The working of the thoracic, bronchial, vascular, and, above all, lymphatic factors is a purely physiological question; mainly respiratory for Freund, mainly circulatory for Rokitsansky. Kuhn has recently turned to a pulmonary purpose Ambroise Paré's original surgical method of damming up the venous circulation, copied by v. Dumreicher, in 1875, and in England by Owen Thomas in 1876, and generalized in 1894 as Bier's method of local artificial "passive hyperemia," a method which has led up to the opposite more drastic procedure of "local artificial absolute anemia" originally practised by Harvey Cushing (1902), and developed by myself² as a curative method under the inadequate designation of "interrupted circulation."

For us let the mechanism be both respiratory and circulatory; essentially circulatory, but modified locally by a respiratory disad-

¹ Mitt. aus d. Grenzgeb., 1911, Band xxiii, p. 583.

² Lancet, 1904, ii, and 1906, i.

vantage. Incidentally the apex is a favored seat for "functional atelectasis," which is answerable to our diagnosis. This is because *apex-inspiration* is largely vicarious, by insufflation from the stronger bronchial draughts at lower levels. *Apex-expiration*, deprived of intercostal aid, is feeble; it is measured, as a mere passive recoil, upon the inspiratory strain and torsion of the first cartilage by the scaleni. In emphysema their incessant struggle is able, even in the less supple thorax of age, to gradually elongate the cartilage and considerably raise the first rib with considerable enlargement of the apical space—a great lesson in the mechanical apex-therapy which we wish to advocate as a *prevention* at the earliest age, and perhaps as a *cure* at the early stage of tuberculosis, and at the earliest stage of phthisis.

The physiological apex difficulty is mainly expiratory; but it means much more than lessened air traffic. To put it briefly, the apex vulnerability is analogous to that of Homer's great hero, unhappily reversed from his heroic attitude instead of thoroughly dipped from the hair of his scalp. His heel was denied the immunizing ablution. Our apex is stinted of its internal immunizing ablution by lack of adequately strong lymph currents. The stray, solitary bacilli that wander in from blood or air are late to wander out again, but never in solitude, "*als Mädchen nicht zurücke.*" One only enters the quiet abode, but many have soon to be turned out of it. If we should have allowed an entrance we must turn on a stronger expelling force, and like Forlanini, in the early stage of the second lung infection we must turn it on to the stronghold by breathing; but we should do this for the first lung instead of the second. The gentle suasion of our bacillotherapy fails of its purpose; the brood has to be turned out by the more rapid and forcible "mechanical" argument.

The Apex Liability. The "soil" is much the same as elsewhere, made up largely of elastic fibers, a tissue of low vitality and of poor protective reaction, and of capillaries the majority of which are not of the nutrient kind, and lastly of an extensive lymphatic system contained in the pervading connective-tissue framework of the pleura which provides for each of the lobules its own visceral pleura. Practically its bronchioles, its circulation, its innervation, etc., are also, so far as we know the same. Its "function," too, is in the main identical. The chief difference, as we shall endeavor to show, is in the mechanical condition of its functional working.

That vulnerability is too obvious to need lengthy comment. Clinical observation, and Freund's anatomical studies have led to the accepted conclusion that it must be connected with its poor ventilation, on the basis of a "thoracic" mechanical disadvantage. The phthinoid chest of liability, and the cylindrical chest of phthisis described by Hutchinson, are household words. The resulting fact that fewer bacilli can be imported than elsewhere contained the further conclusion by

Rokitansky that the "vessels" must be responsible for a special aptitude of the breeding ground, and this in a broad sense is compatible with a purely mechanical theory. Freund suggested long ago a remedy for the thoracic factor, Bier and Kuhn more recently for the vascular factor; but practically in vain. The apex liability is universally recognized; little or nothing is done to meet that apex indication.

The Pulmonary Immunity. The most striking feature of the human lung is that it is so immune; and of the apex that it is so liable. It might almost be said that our lung is prone to tuberculosis merely because, like Achilles, it has just one exceedingly vulnerable spot, though immune in every other part. Where could a tuberculous lung be found if we could absolutely eliminate all apex infection? The view that the human lung has no special proneness to tuberculosis, except only by reason of the apex, is also supported by the considerable length of time it takes the apex lesion to overcome that immunity by mechanical spread. Admitting the postulate that we "inhale our bacilli," far more of them should go to the best ventilated regions; it is there that they are conspicuously inoperative. On the other assumption that the blood deposits them—then why not where its largest streams flow? The most plausible conclusion is that, whether the bacilli be wafted or floated into the pulmonary tissue, the site of their depots is determined by reason, not of the bulk of the importation, but of the local failure of exportation. In short, the lung must be credited with an immense power, and its apex with an exceedingly feeble power, of getting rid of bacilli; and that view can be satisfactorily argued on a mechanical basis. The practical point is, not "why has tubercle attacked this lung?" but "what has happened to this apex to cause it to harbor the bacillus?"

The "Pathological" Apex Immunities. The pathology of tuberculosis, and much more of phthisis, is built up of the mechanical factors of "local" bronchial spread by contact, inhalation, and gravitation; and of "general" toxic auto-inoculation by lymph infection and blood circulation, with little or no sporadic foci, but only local extensions (progressive local consolidation; and progressive bronchial tubercle in Carswell's grapes). But let us turn from the physiological vulnerability of the apex to its singular immunities of apparently pathological derivation which mean immunity from pulmonary tuberculosis; and in particular to the traditional and apparently well-justified instances of scrofula, emphysema, mitral disease, and rachitis. I submit as an explanation the mechanical factor, but in scrofula I admit this is an inference rather than a demonstration, and the immunization doctrine is allowed hitherto a wide field. Does scrofulous tuberculosis exercise the heart with pyrexia and the lung with associated hyperpnea? I believe that it does. French observers have laid great stress upon the vastly increased "respiratory exchanges" special to tuberculosis.

In that light the mechanical factor apart from all others, might explain why that juvenile disease should improve the apex, and, as a rule, prove to be an efficient insurance against its future blood or air-infection, as a blessing in disguise. But for more obvious demonstrations of the same tale of immunity by apex culture favored by disease let us look at the other instances.

Essential Emphysema, viewed as a mechanical result of overbreathing, is not a protection against acute miliary tuberculosis; but it is a considerable protection against apex tuberculosis and tubercular phthisis. This is in spite of a greatly restricted alveolar blood circulation. That protection then is not from blood in excess, but, to put it broadly, from excess of air; in reality it is due to the varied mechanical effects of a continued excess of inspiratory inflation. Incidentally, we note that phthisis is no protection against asthmatic emphysema. More especially should we note that every miliary deposit is guilty of some collateral emphysema; for this is an important factor in the dyspnea of acute miliary tuberculosis.

Mitral Disease, and in particular, stenosis, is acknowledged to be a relative protection. Rokitansky, as an anatomist, attributed this to a "blood overcharge," still obvious at the apex in death. Bier, the clinician, founded upon that "anatomical" explanation the rationale of his entire mechanical method; and Kuhn that of his own application of it to the lung. All three have overlooked the "physiological" explanation. "Panting" stenosis *has to breathe* with the congested apex, when refused adequate service by the much worse congested base.

Greater interest, both theoretical and practical, centres in the unexplained nature of the relative immunity conferred by rickets, and by kyphosis of rickety derivation. The "calcium" idea has always been the chief theme for discussion; and it has recently been given renewed prominence.

The Etiology of Rickets from a specific air-borne toxin, assumed by Ribbert and Kassowitz, is rejected by W. Dibbelt,¹ who believes in a disturbance of the calcium metabolism of variable causation under the favoring conditions of active skeletal growth.

In that connection it might have been argued that, as calcification is one of the characteristic results in the "cure" of tuberculosis, a decalcifying disease such as rickets might be regarded as more likely to favor its "growth." But no safe conclusion can be based upon that argument so long as that decalcification itself fails to be identified with the primary cause of the rachitis. The essential etiology is much more likely to be connected with the gastro-intestinal disorder; and this opens a wide field for toxemic speculations, and for a bacteriological conception of the disease and of its constitutional hall-mark. There

¹ Deutsch. med. Woch., March 20, 1913.

is much plausibility in the view that in the case of scrofular or "surgical tuberculosis" the immunity is of a "vaccinal" order; and, given the wealth of the intestinal flora in rickets, there is ample scope for similar possibilities. As, however, that speculative explanation carries us no farther than the elementary wisdom of intestinal sanitation, it is more profitable to extend our consideration to the tangible features, and, in a matter which is essentially pulmonary, to those which are impressed upon the lung itself. Nothing could be more obvious than their mechanical character. That significance will be further elucidated in connection with our apex-orthopedics. Let it suffice here to note the fact that in its pigeon-breasted softening the thorax becomes the obstacle instead of the help to respiration; and that the same is true of the rise of the diaphragm so long as it remains uncorrected. The apex, least influenced by either of them, suffers least hindrance; and it is called upon by the disease to assume temporarily a leading office, and an increased share in the respiratory function. At that plastic stage a few weeks will suffice to fashion the upper chest structures to a shape which in later life it takes years of emphysema to develop. Some of it remains, and has to be taken into account, at least as a part, if not as the essence, of the lasting immunity.

I. The Treatment of Phthisis. SANATORIUM AND OPEN AIR. *An Actuarial Essay on Sanatorium Statistics.* This appears in the Drapers' Company Research Memoirs under the title of "A Fourth Study of the Statistics of Pulmonary Tuberculosis; the Mortality of the Tuberculous; Sanatorium and Tuberculin Treatment, based on (1) Dr. Lawrason Brown's Adirondack Sanatorium Data; (2) Data from Two Scottish Sanatoriums; (3) Dr. Austin Flint's Data from Presanatorium Days." This patient and laborious inquiry ends in nothing but to show that no safe judgment as to the real value of modern methods can be founded upon existing data. A more critical comment could hardly have been passed upon the fluid state of our pathological and therapeutical standing than Karl Pearson's introductory plea for the expenditure of a "few thousand pounds on a more thorough study of the origins of phthisis and of the relative value of existing and alternate treatments."

Open air, our initium sapientiæ, has been well taught and "durchaus studirt." It is incapable of breeding tuberculosis. We are now realizing that it is not always capable of curing tubercle. But it stands as our great preventive, truly "specific" as the feature of the "preventorium." In reality, pure air is simply our blameless element, indispensable to the cure, just as much as pure food. But neither its ozone, its oxygen, its nitrogen, CO₂, or ammonia, or any of its many subtle emanations yet discovered or discoverable, can be curative—excepting perhaps the once-famed impure emanations of the "cow-shed." For what it is worth, it is cheap and everywhere available. What is the secret

of its great reputation, the inwardness of "open air" *per se*, apart from any exercising, and irrespective of its varied local qualities as town or country, mountain or sea, tranquil or windy, dry easterly or southwesterly humid? It lies for all of them in the physical and psychical "open-air attitude" of the subject—the highest form of wakefulness of the entire organism and therefore of the lungs—psychically induced through the senses, physically through cutaneous stimulation, and mechanically through increased heart action and raised arterial pressure. That organic exhilaration is manifest even in the panting mass, once a dog, temporarily rescued from fender incubation. It is the opposite of sleep in bed, our *nec plus* of rest with its minimal lung and heart actions. Even in the bath chair and under wraps it is essentially organic exercise; variously taxing the muscles for heat production according to the temperature, and our entire "neurohormonic system" for energy.

Cold open air is a much higher power of the same "tonic," and therefore subject to caution. Some years ago a craze, now happily exploded, seized upon the winter contingent of invalids at Davos and influenced even their advisers, for night and day "arctic cold" as a cure. Doubtless a potent agent, it is dangerous in proportion. Cold open air calls for more wraps; but under them any excessive intrapulmonary refrigeration strikes deep. It has overtaxed many a heart, and, as we are well aware, the cure of phthisis lies in the heart.

Sanatorium and Hospital. Sanatorium is an elastic quantity, of little or of much good. "Give me a fulcrum, and I will lift your earth." The sanatorium is the fulcrum for many levers. But they are not forged at the sanatorium, nor even at special hospitals, however indispensable. The all-important member in the essential trial is the general hospital, under the fertilizing stimulus of its medical school; its phenomenal cerebration fed by the invaluable out-patient clinic, at the best age for "les hauts désirs et les grandes pensées."

Rest and Exercise. Other crazes have had their day, during the experimental period, at the cosmopolitan city of Sanatoria. I can recall the great battle, many years ago, between the toboggan and the *liege-stuhl*, practically "tissue-tone" *versus* "tissue-rest"—Bodington *versus* Hilton. The instinctive physiological cure of the British, and the reasoned pathological cure of the Teuton were both, in their exclusiveness, hopelessly at variance with common-sense, and yet both of them are founded upon sound principles. It was inevitable that the toboggan, the skate, and the mountain, should tell their tale of undisciplined recklessness in occasional dramas of hemoptysis or collapse; while, under a rule of perpetual recumbency with over-feeding, the more insidious evil of cardiac and organic depreciation, and, alas, moral too, worked its pulmonary mischief uneventfully and in apparent security, often under the disguise of bloated fattening.

Ultimate capitulation was thus merely a matter of time; and for a while British and German lives alike were spent in *dorsal decubitus*, wholly regardless of the mechanical factor in phthisis and its treatment. Meanwhile Dettweiler and Walther were taking the broader view that both principles should contribute their due share. The striking success achieved at Nordrach was an unanswerable criticism upon Davos.

"Exclusive rest" passed away when Turban's Sanatorium was fitted with a gymnasium. But the most striking recantation had yet to come in the shape of its auxiliary sanatorium recently established at the lower level of the Italian lakes for better facilities to carry out Paterson's cure by "graduated labor." All things are good and bad according to our use of them, and this applies to our two great principles. Their contradictions are apparent only.

The Liege-stuhl or Supine Couch. A life spent on the back for weeks or months sins against that mechanical principle, regardless of gravitation down the bronchial tree which spreads its largest branches backward to the lower lobes, and of the fact that our great respiratory reserve is dorsal, and that most of it resides in the unequalled expansibility of the posterior bases. The working of the mighty diaphragm is not, as was loosely taught, vertical, but chiefly anteroposterior. This lower dorsal expansion is effectively suppressed by a dorsal decubitus, and systematically too by unrelenting relays of fermentable milk.

The Prone Inclined Couch. The prone inclined plane, which has now achieved full recognition in the treatment of bronchiectasis, is hardly less rational as an indication applicable both to early tuberculosis and to phthisis, although only for intermittent use. Yet it was only five years ago that Dr. Tucker Wise¹ realized the fitness of that mechanical indication, which had not been specified for phthisis by Quincke, by myself, or others interested in the inclined plane, and advocated its adoption. It seems to be still hardly known or employed. But we may yet perhaps hear that Tucker Wise's light and portable wicker couch² has had or is having a trial at some of our sanatoria.

II. Tuberculin and its Results. Due prominence should be given to the first official pronouncement by the American Government on the failure of evidence in support of Friedmann's³ cure. "In our opinion harm may have been done by this undue publicity insofar as it has lessened the confidence of tuberculous persons in well-recognized methods of treatment or interrupted their use, and we are constrained to advise against any lessening of these well-known measures which not only have effected cures, but which have reduced the incidence of the disease."

¹ Lancet, xix.

² Obtainable at Harrod's Stores, Brompton Road, S. W.

³ Medical Record, May 17, 1913.

Any Claim to Priority for the Live-bacilli Principle in Friedmann's method is disposed of by the array of facts supplied with their references in an editorial of the *Journal of the American Medical Association*,¹ in which it is awarded to American medicine. "Trudeau, in 1891 and in 1892, demonstrated the principle of using slightly virulent cultures derived from another species; and, in 1892 and 1893, he immunized rabbits to such an extent by the subcutaneous injection of lung cultures of the avian bacillus that when they were inoculated with virulent cultures, the inflammatory reaction gradually disappeared, leaving the eye in the normal condition, while in control animals the destruction of the eye was complete.

In 1901, McFadyean not only demonstrated his ability to produce immunity in cattle by the use of living cultures, but also in one case treated an animal which was already tuberculous. The animals resisted for a long time injections of tubercle bacilli of proved virulence for cattle. In 1901, von Behring announced his method of bovo-vaccination, the first detailed publication of which appeared in 1902. Living cultures were used. In 1903, Thomassen reported experiments in which, by the intravenous injection of human tubercle bacilli into young cattle, he produced a considerable degree of immunity. De Schweinitz, in 1894, immunized animals with human tubercle bacilli which had been cultivated for twenty generations on slightly acid broth. At the end of this time, the cultures were not virulent for guinea-pigs, but were capable of immunizing these animals to such an extent that they resisted infection with the bovine germ. Control animals died in seven weeks. Pearson and Gilliland demonstrated that human tubercle bacilli which were not virulent for cattle would produce a high degree of immunity when injected intravenously. In 1905, the same authors demonstrated a strong curative action on tuberculosis from injections of non-virulent tubercle bacilli derived from human beings. Webb and Williams also demonstrated that immunity against tuberculosis could be produced by the inoculation of living tubercle bacilli, beginning with small doses and gradually increasing. Lastly, in 1909, Valée reported experiments in which young animals were rendered highly immune against virulent bovine infection by the use of non-virulent living cultures derived in the first instance from a horse.

Nevertheless, it must be recognized that these triumphant results in experimental immunization are still a dead letter, so long as they remain unavailable for the protection of the human subject. We have pointed out that clinical bacteriology conducted on the lines of safety hitherto followed, has lagged far behind its avowed purpose. Friedmann's attempt may be doomed to disappointment like so many

¹ Vol. xl, p. 753.

other debuts, although he lays claim to the credit of having broken new clinical ground.

Our Present Stage, in spite of a rooted belief in the principle, and of undaunted attempts at demonstration, is still experimental. The question is in a delicate state; to put it categorically, "Does tuberculin cure animals?" If it could be shown that it does, why should it not cure man, if only we could find the human way to it? Friedmann professes to have shown it us; but failing his help some other might give it. The un hoped for reward is often of the eleventh hour; that is the *argumentum perseverandi*, which no man dare ignore. Still, we do not yet discern that solid advance, that getting into touch, which shape like victory. Let us once perceive that the first position has not only been stormed but held, and we shall quickly concentrate in the field of practice.

The clinical experiment is limited in its scope to the early and middle stages. It is further hampered by the experimental error and by the possible errors of observation again recently insisted upon; both these admit of future improvement. The other, hitherto unconquered limitation to our therapeutic ambition is the slowness of tuberculin action. Still there is much hope in the study of the demonstrable cultural mutability in the virulence of the seed through variation in the soil. Some solid gain has already accrued from our bacterial alchemy, and yet more of hope perhaps in the direction of a quicker action from the earlier employment, which is not yet much favored, of the strains now in use.

Another Year of Tuberculin. The latest practical merits of our tuberculin therapy could hardly be more faithfully mirrored than in a critical review,¹ penned since the critical papers to which we have referred, of a revised edition of "Tuberculin Treatment," the joint work of such reliable observers as Clive Riviere of the City of London Chest Hospital, and of Egbert Morland of the English Sanatorium, Arosa. *Experto crede*: inexpert testimony has the sorry advantages of the uneducated vote, crushing power by weight of ignorance. All accurate weighing is the monopoly of refined technical experience. The true drift of recent scientific opinion may be gathered from the fact that its most recent oscillations have been mainly centripetal; more assents than skepticisms in proportion to the closer individual study of technical fact by the would-be judges. This is a sign of hope. But the leading note struck by our reviewer is steadiness in weighing and caution in prescribing. The tale of the year has been one of great increase in the "institutional" use of the remedy, and therefore a more conclusive demonstration of its prevailing safety. On the other hand, the two methods for producing immunity (*a*) by means of large doses

¹ British Medical Journal, May 31.

pushed until tolerance is established, and (b) by means of small doses extending over long periods and not pushed to the extent of producing tolerance, both appear to have furnished undeniable benefit, apart from mere faith in a mysterious remedy. For a time at any rate the influence of the tuberculous process is checked, and the individual regains and maintains strength to a degree not attained by treatment on general hygienic lines alone.

Focal reactions are to be deprecated, as in every case the use of inoculation is practically a leap in the dark.

The treatment of "mixed infections" does not appear to have made much headway. It is only in cases of open tuberculosis where surgical measures are possible that septic infections can be dealt with effectively. In view of the prospective multiplication of tuberculous dispensaries the question of the success or failure of *ambulant treatment* becomes a burning one. The methods adopted at the Phipps Tuberculosis Dispensary at Baltimore are a type worthy of adoption, and the experience gained at the municipal dispensary at Portsmouth affords some idea of the practical prospect of the movement, as a daily supervision of many thousands has thus far recorded no catastrophe, although possibly some might have deliberately abstained from further treatment, lest a worse thing should befall them. The personal advantages offered by ambulant treatment are obvious, but it has its scientific drawbacks.

In conclusion, general experience points out that closed tuberculous foci, uncomplicated by secondary infection, can be rendered quiescent or inert by tuberculin far more readily than by simple hygienic or therapeutic measures. In cases of open tuberculosis, already the seat of mixed infection, tuberculin used with caution is a valuable adjunct to the latter. Many are unquestionably better with it than without it, but in such cases it cannot be regarded as a specific in the same sense as would apply to the uncomplicated conditions.

Attention has recently been prominently called to the fact that tubercle in susceptible animals has never been shown to have been cured by tuberculin. Clinical experience does not warrant any larger assumption than that a neutralizing effect is produced upon the focus of disease, rendering it inert and for a time incapable of reinfecting the body. But this effect would seem to be temporary, and only the maintenance of sound health thereafter will serve to maintain permanent quiescence.

Tuberculin or No Tuberculin? Twenty-three years after frantic hopes were stilled by disaster into suspended animation, we owe a debt to all who have labored to rekindle them; and not least to those who never did despair. The practitioner is still waiting for the verdict of the experts. If not yet a cure, it is full time it were perfected into one. Its handicap is its slowness. If the race be started early, even

then the disease gains head for a while; if later, tuberculin may come in too late; and later still it cannot be run at all. But this is not all. The skilled verdict is not unanimous as to its specific powers. A great step toward that demonstration is the frequent disappearance of bacilli from the sputum quite recently demonstrated by Turban, by Bardswell, and by Riessmann. But this is not absolutely conclusive for skeptical experts. And even the hopeful ones are delayed by the fear of mobilizing by tuberculin some perhaps harmless, sleeping deposit.

The practitioner's first question, whenever an early diagnosis offers for the method the ideal conditions for success, is "tuberculin or no tuberculin?" The expert answer is not unanimous; mainly because, it must be owned, there are still some expert misgivings as to the harmlessness of the remedy in the early case. His next question is as to which of the methods to adopt. The answer is perplexing as it comes from such opposite teachings as those of minimal or of intensified doses. Yet greater perplexity arises as to the choice of the preparation. Is this immaterial, as held by Sahli; or does it matter much, as held by the individual votaries of special varieties? Is it more essential to study the peculiarity of the patients' response with a series of them, or the peculiar merits of any given preparation in a series of patients, for the acquisition of a better personal experience of, and of the best skill in, its use? Granting that as it is, after all, always tuberculin that is administered, the discouraging stigma which attaches to any "multiplicity of remedies" does not apply, granting even that the success severally reported from those multiple forms might be argued as a direct testimony to the genuine value of the main agent contained in all of them; yet, in so delicate a matter, slight differences cannot, as it strikes the outside observer, be unimportant. He is driven to the disappointing conclusions that the optimum cannot be attained uniformly from all the divergent methods; that possibly it may not yet have been attained by any of them, although they may approximate more or less closely to it; and that, practically, on most of these points opinion still reigns supreme. Is it not high time that this apparent conflict between authorities were authoritatively settled by systematic concentration upon the essential questions? For some definite illustration of the nature of the prevailing uncertainties and some of their causes, without rehearsing the long story of the controversy, we need only look to its latent instalments, and first to those quite recently contributed from the King Edward VII Sanatorium.

Sanatorium or Tuberculin? Noel D. Bardswell's¹ statistical tables and report on the results of treatment at the King Edward VII Sanatorium are of much value owing to the history of the Institution having

¹ Lancet, 1913, vol. i, p. 679.

comprised two therapeutical phases for comparison: namely, during the first five years, sanatorium treatment pure and simple without any tuberculin, and since July, 1911, the same treatment with the addition of tuberculin administered in the same three groups of cases—"slight," "moderately bad," and "very bad," corresponding to the Groups I, II, and III of the Turban-Gerhardt's classification.

During the first period 1082 patients were treated, 52 of whom, or nearly 5 per cent., did not justify eventually the diagnosis of tuberculosis. Of the remaining 1030, 17.5 per cent. did not yield tubercle bacilli; 82.4 per cent. did. As 110 patients were lost sight of, only 920 are included in the report, namely, 764 with demonstrable bacilli and 156 without. The results for the first set (with bacilli) were as follows. In Group I (183 cases); survivals, 83.6 per cent.; deaths, 16.3 per cent. In Group II (357 cases); survivals, 61.6 per cent.; deaths, 38.3 per cent. In Group III (224 cases); survivals, 28.5 per cent.; deaths, 71.4 per cent. The results for the other set (156, without bacilli) were: survivals, 89.1 per cent.; deaths, 10.9 per cent., and relapses since discharge, 18 per cent. This relative advantage is just such as might have been expected, for these are cases amenable to cure, and are not a severe test for therapeutic efficiency. But in the first set (with bacilli), more definite conclusions are possible. The record of the early cases (Group I) is almost as good as the preceding one. The sanatorium does for them all that is required, viz., a more favorable environment, with practical lessons in hygiene. As regards the late cases (Group III), the result is comparatively fair, but the mortality of 71.4 per cent. shows how little permanent benefit is to be expected from sanatoriums.

In the more instructive group (II) the patients, with perhaps two or three lobes involved, may retain much of their condition and recuperative power. They provide the best test—for a spontaneous cure is hardly conceivable. It must be owned that the sanatorium treatment result was not a brilliant one, and that for this type, which is that of the average "consumptive," something more is needed than sanatoriums can give.

The Disappearance of Bacilli and its Significance. The smallness of the number (158 out of 764, or 20.6 per cent.), who lost their bacilli after some four months' sanatorium treatment means that but few can hope to leave our sanatoriums apparently cured. How the prognosis reads is shown by the relative percentages: 84.1 per cent. survivals, with 15.8 per cent. deaths in the one case, against 50.1 per cent. and 49.8 per cent., in the other. Some of these 158 belonged to Group II, and did equally well as those in Group I. Only a few cases (15) of much advanced disease lost their bacilli, and 40 per cent. of them remained in fair health. The aim of treatment should therefore be to obtain a non-bacillary state of the sputum, for the sake of the individual and the public. For this purpose it is held by Löwenstein,

Bandelier, and Roepke, and by Curschmann that "sanatorium and tuberculin combined" are much more effective than sanatorium alone.

At the King Edward VII, and at sanatoriums in general, the answer to the main question is still in the making. Meanwhile, as dispensaries are multiplying, it is desirable that their records were kept on some uniform plan. If the "tuberculin dispensaries" can prove their boasted ability to achieve quite as much for early cases "at home" and in spite of "continual" work, as is done at sanatoriums, then, as Bardswell says, the advisability will have to be considered "of refusing to admit the very cases, which at present, they endeavor to admit to the exclusion of all others. Sanatoriums could then concentrate upon the less favorable subjects, for whom something more is required—longer treatment certainly."

C. Riessmann's¹ experience at the Kalyra Sanatorium, South Australia, where tuberculin was first introduced in 1910, is practically identical with that of Bardswell. The previous percentage of bacillus-clearance in the sputum had been 31.3; it is now 20, the increase being 11.3 per cent. as against Bardswell's 12.3 per cent. Strangely, as regards the early cases, that increase was exactly the same at both institutions, 16.6 per cent. for Bardswell, and 16.6 per cent. for Reissmann.

Bardswell,² shortly before, had made a first communication upon "Some Observations upon the Treatment of Pulmonary Tuberculosis with Small Doses of Tuberculin, the Dose being regulated by Frequent Estimations of the Opsonic Index. In this he refers to 17 cases, somewhat advanced, which were treated in strict accordance with Sir. A. Wright's own words: "*I regard it as a matter of great moment, especially in connection with the immunization against tubercle, to employ in every case the smallest dose which will elicit a satisfactory response to repeat the dose only when the effect of the preceding inoculation is passing off, and to increase the dose only when it becomes clear that the dose previously employed is ceasing to evoke a sufficient immunizing response. Acting in accordance with this principle I now begin with a quantum of tuberculin corresponding to not more than $\frac{1}{1000}$ milligram of the tubercle powder, and never advance to doses larger than $\frac{1}{600}$ milligram.*"

The immediate results did not include, in spite of satisfactory immunizing responses, any appreciable alteration in temperature, amount of sputum, etc., or in the clinical condition in general, nor any evidence of hypersensitiveness. The late results compare somewhat unfavorably with the like cases which were not treated with injections; and the conclusion he arrives at is "that the tuberculin was in the cases treated a negligible factor, and in no way influenced either the immediate or the ultimate prospects."

J. B. Dixon³ follows Camac Wilkinson in believing that the best

¹ Lancet, May 24, 1913.

² Ibid., 1913, vol. i, p. 17.

³ Dublin Journal of Medical Sciences.

results are to be obtained from the maximal doses of the particular preparation in use. Short periods with small doses are worse than useless. He aptly points out that as tuberculosis cannot remove gross lesions, its effects, in bad cases, cannot be safely judged from any changes in the physical signs.

The Latest Call for Strict Evidence is supported, with full array of arguments, by Batty Shaw's¹ paper of May 3, on the strength of his bacteriological competence and of his Brompton Hospital experience. These need not be enumerated here, but we agree with James W. Allan² that one of the arguments brought forward on the negative side has great significance: "If it were proved," says Dr. Batty Shaw, "that tuberculous cattle could be cured by vaccination by means of tuberculin, we may be quite sure (1) that it would be widespread in veterinary practice; (2) that the whole medical profession would have adopted it with very little hesitation, and they would have been justified. But where are the reports on cattle which should make us at ease on this point? Frankly, they do not exist. As a profession we are wrong in our methods of estimating 'cures' in the only sense a layman wants to hear of them—real 'cures,' complete eradication of the cause. We have too long judged of 'specific' cures without allowing for the *post hoc, propter hoc* fallacy. We cannot afford to do so any longer, because our statements are being revised by skilled mathematicians; our 'impressions' of proof of cure have been put into the scales and they are found wanting."

E. E. A. T. Rigg's observations on the "controlled" therapeutic use of new tuberculin in the treatment of pulmonary tuberculosis were made at Dr. Batty Shaw's suggestion upon equal numbers of his afebrile cases. They were treated respectively, 10 with and ten without tuberculin, for three months, under a plan devised by Mr. W. Palin Elderton, F. I. A., that of checking the results by the *physical signs* instead of by such questionable criteria as "the general condition," "increase of weight," "functional capability," "occurrence or non-occurrence of relapses." An initial examination and graphic representation was made of the physical signs in each case, by Drs. Rigg and Shaw separately—and again by Dr. Shaw separately at the end of three months, for accurate comparison. Increasing doses of T. R. were given at intervals of two days from 0.00001 up to 0.1 milligram and subsequently of four days from 0.15 up to the maximum dose 0.7 mg. Interruptions of five to ten days with rest in bed were enforced whenever a febrile reaction occurred.

The Summary of Results was as follows:

1. *Physical Signs*: (a) Tuberculin-treated patients. Out of 10: Improved, 1; worse, 4; *in statu quo*, 5. (b) Non-tuberculin treated patients. Out of 9: Improved, 4; worse, 3; *in statu quo*, 2.

¹ British Medical Journal, vol. i, p. 921.

² Ibid., p. 1140.

2. *Increase of Weight:* In (a): Average percentage of increase of weight, 6.3 per cent. In (b): Average percentage of increase of weight, 10.3 per cent.

3. *Capacity for Walking, per Diem:* (a) Tuberculin patients (10 cases): two miles and over, 3; one to two miles, 5; less than one mile, 2. (b) Non-tuberculin patients (9 cases): Two miles and over, 6; one to two miles, 3; less than one mile, 0.

4. *General Condition.* This is a difficult criterion, but, generally speaking, in (a) only 5 out of 10 were in thoroughly good condition; in (b) 8 out of 9 were in thoroughly good condition.

The net result of these observations is to show that the administration of new tuberculin by one of the more popular approved methods is not followed by greater improvement in the *physical signs*, nor by greater increase in weight, nor by more greatly increased capacity for physical work, nor by a greater improvement in the general condition, as compared with the results of ordinary hospital methods. "The observations on 'the signs' do not support the idea that new tuberculin in any way lessens the activity of the local lesion. It is possible that the less favorable influence on weight, the less capacity for work, and the falling off of the general condition are due to the disabilities imposed on the patient by being treated with tuberculin, as they so often were kept in bed to help restore the temperature to normal."

III. **Artificial Pneumothorax.** Nature's great cure was learned by Forlanini¹ from a contemporary case published by Bosisio and from that of Stokes. It was published in 1882, the second year in the Kochian era; though not practiced by him until 1892, the second year in the tuberculin era. Wm. Cayley was the first to carry it out (at the hands of the late Mr. Hulke) at the Middlesex Hospital in 1885, for the arrest of hemoptysis; and in this he succeeded. But it had been *invented* in 1821 by James Carson,² of Liverpool, in the course of prolonged physiological experimentation on the elasticity of the lung, and without reference to any lead from clinical pathology. He published it in 1822 with the prophetic remark: "'The Essay on Lesions of the Lungs,' read before the Liverpool Society in November, 1821, contains the first practical application of the physiological opinions which I have ventured to submit to the public, and the proposal of a new method of treating a disease hitherto deemed incurable." He foretold the cure by it not only of consumption, but of abscess, and of hemorrhage. Forlanini's great claims remain undiminished; but at least in this country, first in the discovery and in the performance, though

¹ "A contribuzione della terapia chirurgica della tisi. Ablazione del polmone? Pneumotorace artificiale?" Estratto della Gazzetta degli Ospitali Agosto-Novembre, 1882, F. Villardi, Milano.

² James Carson, M.D., *Essays, Physiological and Practical*, Liverpool, 1822.

so slow to contribute to the elaboration of the method for which we are chiefly indebted to Murphy's brilliant surgery, "Carson" should be the familiar name under which it should be known.

THE LESSONS OF INDUCED PNEUMOTHORAX. The first of the general lessons is "hopefulness." "Do not think, but try"—almost within hearing of Jenner's lesson from his great master, Carson thought out in 1821 "a cure for incurable consumption." It was not tried until 1885, and not adopted until 1892: the profession was "expectant" for three-quarters of a century. In the individual case our treatment is still relatively expectant in the neglect of available suggestions for prevention (Freund), and of early curative measures, both specific and mechanical.

Imitare Naturam. It is given to few to provide her with patterns; Carson was probably one of them. His claim is that of an inventor much more than of a seer. Forlanini, most probably as unacquainted as most of us here with his work or his name, copied nature in her spontaneous cure. From that faithful replica it is for us to copy not only her main plan, but also her varied moves: two sets of principles, those of the method, and those of the mechanical means.

I. *The Principles of the Method* are simply these: (1) *The Local Attack* must concentrate upon the disease. If at the left apex only, our treatment is for the left lung; it is irrational to apply it to the right. Our first principle is "local unilateral treatment." (2) *The Supplies for the Attack* must come from elsewhere. Oxygen would run short without due provision. For this the right lung is alone available, and calls for treatment. Our second principle is "bilateral treatment." (3) *The General Plan.* That bilateral treatment must be suited to the bilateral difference. When this is absolute, as between advanced disease and perfect soundness, it will have to be of strictly opposite kinds; in terms of the lung, pulmonary rest and pulmonary activity, and in special terms of pneumothorax "unilateral arrest," and "unilateral stimulation"—the fundamental requirement being "unilateral breathing." (4) *The "Margin of Risk"* to meet the uncalculated unknown entails inconsistencies in all planning. The method is reserved for unilateral cases; but, as it often happens, there may be latent disease on the other side, and the strictness of our discriminating unilateral treatment collapses. We are then applying to a secondary lesion the sound lung treatment. *Felix culpa*, if it should succeed—and it often does. This is much more than a hazard. It is Nature's demonstration of our greatest practical resource. Her inconsistency points to our last principle: "Opportunism and compromise," *in contraries*. Theory alone is one-sided and intolerant, and stops the way to progress.

II. *The Principles of the Mechanisms.* These need be only enumerated, in view of their further consideration, as the following: (1) Unilateral physiological rest, and (2) unilateral physiological activity,

in their absolute form both special to pneumothorax (except for unilateral hydrothorax, and unilateral main bronchus obstruction); (3) unilateral pulmonary compression, and (4) unilateral pulmonary expansion (with the same reservations); (5) unilateral "atelectasis" needs to be specified, as it is the essential principle at work; in this special form of solidifying or solid-compression, atelectasis is the aim, and is attainable experimentally without any compression or pneumothorax, by pulmonary artery ligature, and by valvular bronchial plugging; (6) unilateral breathing, the subsidiary result of the operation, is by far its most important practical principle: it contains the germ of a "physiological" apex-compression, as a substitute for the "surgical," but this remains to be tried, as Bouchard's suggestion long ago (about 1880) of "pulmonary insufflation" as a driving pressure for the evacuation of empyema is not strictly physiological; (7) gravitation belongs to all mechanisms, and therefore to pneumothorax in its evacuant action, but it is not its most prominent feature.

Apex-orthopedics and Spinal Culture. A man "hip-struck" mobilizes his lumbosacral spine to assist the feeble work of the helpless limb; another, distressed with right brachial or right intercostal neuralgia, mobilizes his upper dorsal spine to enable the left chest to relieve the other side of its painful work. Keep them in bed; in both instances the obviousness of those results will be reduced to a vanishing point. From this a general inference may be drawn, that in phthisis-prophylaxy the apex question is largely a *spinal question*. The practical inference is that for effective apex results we are dependent upon two working agents, "apex-exercise and unilateral breathing." Moreover, if apex aëration can be shown to be curative (as suggested by artificial pneumothorax), as well as immunizing (as suggested by emphysema and by some other affections), those two agents should be efficient aids in our early treatment.

Spinal Culture. The spine is the keel, our main fulcrum for our entire moving machinery. It is usually rigid for the stronger effort of our muscles, yet eminently mobile for the fine as well as the coarse adaptation of their immensely versatile work, and for that also of our viscera. The spine is thus, in all disease hardly less than in health, the primary mechanical consideration. That earliest chapter in our pediatrics is unhappily not often brought to the notice of our students and postgraduates, who are left to discover the results of that oversight only when they have grown beyond the proportions which appeal to the keener attention of dressmakers and tailors, and have already consolidated, with the spine, into more or less incurable deformity which is referred to the specialist, though it influences the entire health. It is then a physician's question; it should have been his question at the cradle-side.

Of all organs, the lungs claim the longest segment of the keel. Yet

mere measurement feebly expresses the vast pulmonary interests vested in it. By far the most vital of those interests belong to phthisis, though least suspected. The spinal chest-factor has been mainly thought of, because so obvious, in emphysema and rickets. *Qua* rigid fulcrum the spine moves the chest; *qua* mobile fulcrum, it is capable of being moved by it. This is merely a question of fixation. Let the ribs be immovable from rigidity, or from bronchopneumonia with blocked air outlet, the spine must move and does. Short of this, as in the infant or weakling, the spine may be so soft and mobile as to invite spinal movement on slighter provocation; but the greater demonstrations result from chronic disease. The bent spine, high thorax, and greatly increased vertebro-articular range of emphysema are the result of years of strenuous thoracic exercise; but the emphysematous chest is finally locked. This is not so in the early adult stage after bad chest-rickets. The same changes are present though less extreme; but the chest is "mobile," thanks largely to the great mobility of the spine. When assistant-physician I made the observation that this kind of individual, contrary to Scripture, can at will increase or lessen his stature, at any rate by fractions of an inch: By careful measurement he was found to shorten with each deep inspiration and to grow up again at each expiration, simply because his spine was "mobilized." If the old chronic bronchitic can increase his apex sagitta by years of dyspnea, why should we not increase that of the pliable little child by a few weeks of harmless exercise?

RICKETS. *The Cure for Rachitis* is simple, and I have found it easy; practically speaking, merely to deflate the bowel, and to inflate the lung. Lime, by all means, and phosphorus; but much greater is the need for oxygen, to link them together, and to bind them to their cellular matrix. Quick cure, however, robs the patient of a treasure; we owe him a substitute for the loss of his ricket-immunity against phthisis. Happily this can easily be provided at that age, and the treatment to be described provides it.

For the Abdomen, the simplest treatment is a small dose of castor oil daily for a time. One-fifteenth of a grain of calomel at night, or a small gray powder, may help; but the most trustworthy antiseptic is that thorough clearance of the mucous membrane of the entire intestinal tube, and a light elastic belt to help its atony and that of the abdomen.

For the Chest, efficient respiration is needed; and the remedy for its mechanical trouble must be mechanical. The diaphragm is liberated by the abdominal deflation, but its normal effort to expand the lower ribs keeps aggravating the mischief all the while they remain concave, as in the pigeon breast, instead of convex. So long as our patients lie on their back, and that is their common fate, the only efficient respiratory work in the entire thorax is at the apex, where there are

no ribs to collapse. In that only remaining struggle to breathe, the thorax is drawn up as in emphysema, and its upper aperture made more horizontal and deeper. The mechanical remedy is at hand. It was exhibited at the Toronto meeting of the British Medical Association, and may have been tried in the New World. The prone position which it provides is awkward in the cot, and the infant has no strength for the "knee and forehead" posture. The best means to bring up the great respiratory reserve of the lower lobes is to safely strap the infant on the "infant-rest" (to be used later, on wheels, as the "infant-exerciser"). In that attitude of respiratory relief, the binder wedges up into the thorax, the liver, and upper viscera as an internal splint to straighten out the bent-in ribs, and to prevent their inverted response to the pull of the diaphragm. The same dorsal respiratory gain is also the chief of the advantages provided by the adaptable "convalescent machine" for the needs of varied states of weakness at different ages, and above all in phthisis. For the latter, Dr. A. Tucker Wise, of Montreux, has constructed a convenient wicker couch¹ to carry out his "prone slanting postural method" (*Lancet*, 1908), copied from Hufeland and Piorry's original suggestion of an "expectoration provoquée." This was revived by Quincke as a general principle in bronchial treatment, and by myself as a special continuous postural treatment for bronchiectasis.

Kyphosis. In the subacute stage of rickets, this prone treatment especially favors apex-exercise, and fulfils the immunizing apex clause better still than the disease. Its pathological mechanism is most strikingly demonstrated in the extreme spinal consequences of that affection, which are also immunizing, as phthisis is exceptional among hunchbacks. In the telescoped and variously crumpled kyphotic chest, the two ends are the best points; both of them broadened to make up for lost internal space. The upper sternocostal ring is conspicuously raised and horizontalized, as in emphysema, by gradual extension of costovertebral articular range. The respiratory mechanism is by "visceral basal pressure," analogous, but that it is bilateral, to the gaseous basal pressure of artificial pneumothorax. It is illustrated by Schepelmann's experimental production of unilateral pulmonary compression without any pleural gaseous injection, but by either dividing one phrenic nerve in the neck, or cutting away one-half of the diaphragm. In kyphosis, the visceral encroachment is bilateral; and, thanks to the absence of any mutilation, physiology holds its own against the pathological odds. Although a great part of both lungs must undergo compression, their apices escape it; on the contrary, they expand under the stress of their vicarious overwork. This demonstrates that any relatively slight basal visceral encroachment, such as that of rickets, although truly an agent of local compression,

¹ Obtainable at Harrod's Stores, Brompton Road, S. W.

must tend to increase the respiratory activity and range of the upper thorax, and, if apex expansion is, as we have inferred, protective, to diminish the individual liability to pulmonary tuberculosis.

To emphasize the close connection between our spinal and apical therapeutics it is worth pointing out that spinal deviation is benefited, and may sometimes be cured, by the judicious systematic use of "purposive" unilateral breathing. On the other hand, faulty breathing of the unilateral type can only be dealt with successfully by spinal culture. And finally, when, in the absence of any spinal or respiratory defect, the only aim is apex prophylaxis by apex-training, spinal culture, and unilateral breathing enter into combination, and reciprocate their coöperation in the service of that end.

The Respiratory Treatment of the Spine. The treatment of scoliosis, by means of general respiratory hygiene and exercises is not new; but any modern elaboration of it into a systematic method could hardly have escaped the notice of our leading specialists and some mention in their treatises; yet neither Roth nor Tubby have anything to say about it. Spitzzy, of Vienna, a few weeks ago was writing in the *Münch. med. Woch.* (March 18, 1913, p. 577) of the "novel" therapeutic achievements obtained by respiratory agency from the method of "simple, rapid, and complete reduction of deformity in fixed lateral curvature" devised by Edville G. Abbott,¹ of Portland, Maine, and used by his pupils, the essence of which is the fixation of the trunk in plaster of Paris in the position of utmost correction or overcorrection obtainable, and the subsequent cutting of windows to locally facilitate the respiratory or other needful movements; these afford local opportunities for influencing the respiratory movements.

While Abbot was elaborating his method, I had entered, three years ago, upon the second and entirely respiratory course, the results of which are now before us, of my treatment of F. E., aged now twenty-five years. He was originally, six years ago, sent from out-patients' to my ward for paraplegia due to an extreme yet unobtrusive left curve and twist in the cervical and upper dorsal region. The Registrar diagnosticated the case as Pott's disease; the late Mr. Clinton Dent regarded it, as I had also thought, as functional; but as he made no suggestions for treatment, I became my patient's "surgeon." Five years ago I showed, before the "polyclinic," the results of the first course by a method which I have never published. A "rack" being indicated for straightening him, I devised one free from all attachments or pressures, except the usual head-gear for suspension, which was hooked to the iron frame of the bed. Instead of using weights, his bed was raised at the head, and I gave him a *sliding mattress* to lie on with complete freedom for his limbs—in reality a polished wooden bottom to his bed, lined with a sheet of polished zinc, the pull upon

¹ New York Medical Journal, June 24, 1911; *ibid.*, April 27, 1912.

the neck being regulated by the slant. This soon cured the paraplegia, and was continued for many months for the improvement of the back.

The "Unilateral Breathing" Treatment for Scoliosis. Three years ago the patient came again to report good progress in strength and career, in spite of the still prominent left spinal bend and twist. Having previously devised, for the treatment of early phthisis, the "chest-clip" described under a later heading, I gave it him to wear around his right upper chest, thinking that by checking the right it might increase the inspiratory rise of the left upper ribs and help them to gradually lever the spine back into shape. However, the chest-clip was soon superfluous, the patient having learned to do his left unilateral breathing without it and at frequent periods in the day. During its performance the tactile observations were most instructive. The sharp curve of the displaced spinous processes was felt to slip from under the fingers toward the right, during each powerful inspiration. The mechanical effect was intensified when the right hand was made to throw the weight of the right chest upon a table or support. Owing to the steady improvement, the inspiratory excursion is now less extensive. The curve persists, but the twist has been largely remedied. The efficiency of unilateral breathing in this severe case has enabled me to recommend it in far slighter degrees of the affection and as a prophylactic against phthisis.

Pulmonary Compression, Absolute and Relative. I. ABSOLUTE OR SOLID PULMONARY COMPRESSION. This is the gradual result of the slight "intrathoracic" differential nitrogen-pressure (of some few inches of water) exerted upon the lung. The compression resulting from any "extrathoracic" pressure, even when pushed to a higher degree, can only be partial. Absolute compression is the monopoly of pneumothorax and also its only curative agent. It has been aimed at with close approach to success by surgery, which can localize its pressures, and which is not committed to the awkward clause of wholesale pulmonary collapse. As a mechanical means, apart from the rather difficult procedure, gas is the ideal, for gentleness, smoothness, evenness, and ease of regulation.

Schepelmann's experiments now suggest to us the pressure of the viscera as a substitute for nitrogen. They constitute another instance, like pneumothorax itself, of a brilliant amplification on an enlarged and "absolute" scale, of some of Nature's simpler and smaller means to which we shall presently refer.

The Uses of Solid Compression. The curative apex action of Carson's method consists: (1) In emptying all spaces, and excluding all air and all septic fluids; and (2) in immobilizing the lymph currents—thereby arresting auto-inoculation; (3) in immobilizing, condensing, and dehydrating the pneumonic tissues—thereby arresting the culture;

(4) in reducing the circulation, and considerably lessening the danger of hemorrhage within the damaged lung (Carson, Cayley, Forlanini, Finzi); (5) in squeezing ulcerated surfaces into apposition and favoring their cicatrization; (6) in setting up unilateral breathing for the benefit of both lungs; (7) in raising the pressure in the pulmonary artery and right ventricle, as a considerable stimulus and tonic to the whole heart. Against these advantages solid compression has no fault of its own, but merely the associated evil of the inevitable atelectasis of the entire lung.

In carrying out her compressions, Nature is not wholly consistent. Her remedy is absolute and offers no concessions, while her disease is most varied, and calls for them. Our present ambition is to help her with means for that needful adaptation. The latter is at fault in time and in degree. Her remedy is of necessity always late; we need it early and must therefore modify its mechanism. It is uncompromising in its absolute unilateral thoroughness of lateral action; we must study to mitigate it by artificial graduation. It is continuous and lasting in its application; we should succeed in rendering it facultative in duration, as well as in degree. It is heroic in its cost and in its dangers. Its wholesale recklessness sacrifices the healthy two-thirds of the diseased lung; we should aim at preserving that asset for recovery. It throws the entire strain upon the other lung at a precarious stage; that great risk we should endeavor to avoid. Our practical task is to isolate the mechanisms from the method for earlier, for safer, and for more general use.

II. "RELATIVE" AND "LOCALIZED" PULMONARY COMPRESSION. Its chief exponents have been Piorry and Stuart Tidey. Piorry, Carson's junior contemporary, may have been under the influence of his discovery and of his teachings, but makes no reference to him or to them. Nevertheless his purpose and his results are of the Carson order. Stuart Tidey's notion is rather that of "support" and "rest" for the damaged lung, and of more work for the sound one. His thoracic compression is by means of strapping applied to the whole of one side in the expiratory attitude; an excellent imitation, with extrathoracic and smaller result, of Carson's wholesale intrapleural compression. Its clinical effect is the same in kind, though far differing in degree—"unilateral breathing." Tidey's method has the faults as well as the advantages of all continuous pressure methods.

Piorry's compression was as local as a surgeon's; and guided to the spot by his searching but ill-patronized percussion. Of his three methods, that for which he claimed the best results, as an emptier of cavities, was the local application of weights, which he piled up in one case over the pectoral region to a total of 14 pounds. His original procedure was to transmit the pressure of a bandage to wedge-shaped compresses placed underneath it. This was a more continuous method, as likewise

that of the strong spring which he had copied from the hernia truss, but from which he does not seem to have much help. With the principle and the results of his pressure method he was greatly satisfied.

Absolute Unilateral Breathing; Its Advantages and Its Risks. A. THE ADVANTAGES. This is practically a chapter in the study of pneumothorax. The uses of relative unilateral breathing are so distinct that they will be best discussed under a therapeutical heading.

I. *The General Gains.* (1) In Carson's method, the towering advantage is the complete delegation of the entire respiratory function from the diseased to the sounder side. The absolute rest ensured to the entire damaged lung immediately removes the drag of its infirmity from which the other had suffered. The immense benefit special to that method is that it relieves the respiration from the trammels of its unilateral lameness and protective restraint. The sounder lung is not only set free, but also compelled to breathe. In that functional increase, if only equal to its opportunity, it is assured an absolute gain equivalent to that of its fellow. Moreover, that gain is twofold, pulmonary, and cardiac. (2) The pulmonary advantage is hyperpnea, hyperventilation, and eventually, after a period of emphysematous hypertension, genuine hypertrophy. (3) The third great advantage is even greater than that of a passive detoxication of the entire system—it is our sadly neglected (under ban of the good drugs as well as of the useless) active *cura curans*, cardiac invigoration. Its operation is soon declared by the early rebound of physical activity in the best cases, which demonstrates the left ventricular recovery. But this is really based upon the working of the absolute unilateral breathing set up by the operation. The pulmonary arterial bed is immediately narrowed by one-third at the lowest estimate; but its remainder is further narrowed by universal overstretching of the alveolar capillaries. Increased pulmonary arterial pressure, and a resulting right ventricular hypertrophy are inevitable, and their existence has been experimentally demonstrated. This is all, in reality, general mechanical hygiene, and general non-specific treatment.

II. *The Special or Apex Gains.* The accidental pneumothorax of phthisis might be added to our list of immunizing affections, as the most brilliant exponent of an immunization, not of apices still free from tubercle, but of an apex already doomed by *contubernium* with a diseased apex, and by inevitable auto-inoculation. That protection is so clearly mechanical by forcible apex inflation, while plenty of poison for apex infection is still circulating, that it practically imposes the same explanation in the case of the other pathological immunizers; and that it becomes the main pivot of the question as to non-specific mechanical treatment *versus* exclusive bacillotherapy.

1. *Apex Overuse and Overinflation* apply to all the cases operated, but the apices differ. Very few intact; some are in the closed stage of

tuberculosis; many, in that of ulceration. Any absolute cure in the first set would illustrate a preventive power. Any decided improvement in the others would prove some degree of a curative power. In the first there can be no reservations in making the attempt. In the others they are great in proportion to the lesions. In effect, the doctrine of "tissue-rest" has been flung to the winds; the risk has been taken. Is it for better or for worse? Happily the main verdict of the results justifies our boldness; yet they are by no means always favorable at first, nor even finally. There is no sufficient warrant for discarding that great doctrine exclusively for the opposite principle. Yet, if so vital, how shall we explain the ultimate recoveries in spite of its temporary disregard? Most probably by the clause of "the extremes."

2. *Mechanical Apex Protection by Overinflation.* In Carson's method everything is big and heroic, and not least the apex inflation. In broad terms we have allocated the opposite curative agencies of compression and of expansion to the opposite apices. That is probably more strictly true of the extrathoracic than of the intrathoracic pressure method. In the latter, the saving clause against the mechanical damage of tissue strain seems to be a mechanical advantage special to "extreme inflation." A little of it might not avail. Much of it can only operate in one direction; *lateral support and even compression* of the inexpandible lesions by the forcibly expanding sound tissue. "Compression" rises in our estimate, and becomes a "bilateral" agent after all. Should no other explanation be forthcoming for the paradoxical cure of both right and left lesions by opposite methods, the foundations of our entire treatment will have to be carefully resurveyed.

B. THE RISKS. This aspect has received so much attention that our remarks may be brief, and mainly confined to points little touched upon in literature. If there has been little to place to our national credit since Carson and Cayley, as regard the elaboration of their method, at any rate we may mention excellent exponents of its progress and present status in Lillington, in Chitty, and especially in Vere Pearson in connection with his wide experience and exemplary attention to the risks and contra-indications, which he has most judiciously considered. Apart from the well-known operative and postoperative risks so well described by them and many others, there are other dangers inherent to the treatment which could not fail to attain prominence if it were to be applied on a very large scale. I may refer to them as the *one-lung danger*, the *air-danger*, and the *blood-danger*.

The "*One-lung Evil*," with its varied respiratory, cardiac, vascular, circulatory, vasotensive, vasomotor, nervous, and neuroreflex risks, affords a general explanation for the fact that fatalities are almost more common in connection with refillings than at the first operation, in spite of the improvement already secured, and of the absence of air-embolism or any major operative mishap. The complex machine has

become precariously sensitive, because always under strain of abnormal working. C. Sundberg in the *Beiträge* for April 13, adds three cases with necropsy to the fatal list collected by B. Hansen in May, 1912; but does not offer any general suggestion.

1. *The One-lung Existence* is open to infective dangers which need no explanation. With one working lung only, the patient is at the mercy of any epidemic, or accidental, infection. A pleurisy with effusion, a sharp attack of bronchitis or of influenza, an acute pulmonary congestion, or a pneumonia find him defenceless, and practically doomed. The other two dangers are likewise "one-lung" dangers, but of a mechanical order.

2. *The Air-danger* is that of a possible rupture of a superficial lobule under the strain of the inspiratory distention of the lung, and the production of a pneumothorax on the working side of the chest which would be immediately fatal. The fact that this accident has not often been recorded might be explained by the relative absence of any great collateral emphysema in the early lesions of the working lung, and of any bullæ likely to give way under stress of breathing. Even in the apparently healthy, a "spontaneous pneumothorax" sometimes occurs, whether from that cause or from the strain thrown upon fine pleural adhesions; it cannot therefore be entirely excluded. But the risk special to phthisis is the bursting of a small superficial subpleural vomica, which is a much less rare event, and might befall the "one-lung" patient with inevitably fatal result.

3. *The Blood-danger* may arise from either lung. Artificial pneumothorax is a considerable security, though not an absolute one, against hemorrhage from the compressed lung, with probable blood-inhalation and drowning of the working lung. But it is not a security in the case of the latter; it is an inducement for hemoptysis to occur; whether in its milder type, or in its worst form, which is the bursting of an aneurysm. This is by reason of the rise in blood pressure in the pulmonary artery. We note that, at the time a successful compression of one lung is achieved, there may have been no corresponding diminution in the total blood bulk of the body, which now has to find its way through the working lung exclusively. The resulting rise in the pulmonary blood pressure might favor the production of aneurysms in the latter, or the rupture of a preëxisting aneurysm, leading to syncope and death. As a fact, pulmonary aneurysms are not usually found in the large original excavations of the damaged lung, but in its smaller, secondary ones; but they are often enough situated in the lung involved secondarily. The rarity of fatalities due to the "blood-danger" must be ascribed to the successful selection of cases free from excavating disease in the better lung.

IV. *The Drug Question in Phthisis.* It was part of the "campaign" at the start to break down obstructive superstitions, but we may have

since suffered, perhaps, from an excess of that zeal in reform. A doubt in that direction is more than justified by Sir Wm. Whitla's¹ masterly oration on "The Trend of Thought in Recent Pharmacological Research." Bacteriological study has brought us back to the deeper study of drugs, in their biochemical reactions indistinguishable from those of toxins, enzymes, and hormones, and to Ehrlich's *Therapia Sterilisana Magna*, or chemotherapy, built up by the work of Binz and of Brown and Fraser. The latest results are those of Morgenroth, described by Wright "as destined to stand out as a landmark in the history of pharmacotherapy, because they furnish the first demonstration of the possibility of preventing and curing a bacterial, as distinguished from a protozoal or spirochetal infection by the administration of a drug." The experiments were made by injecting mice with the pneumococcus, which always proved fatal when untreated. By injecting erythryhydrocuprein hydrochlorate before the inoculation, 90 per cent. of the rodents were saved, and in 50 per cent. death was prevented when the salt was injected after infection.

Whitla ends his inspiring remarks on chemiotaxis with a reference to the subject of gametic attraction brilliantly handled by Sir. J. J Bland Sutton last year. Pfeffer experimentally demonstrated that malic acid strongly attracts the spermatozoids of various ferns when brought within their zone. Now, this substance has been found to be produced within the female sperm cell; and it can hardly be doubted that it is the agent which determines the actual contact of the male with the female elements of the cryptogam. We are led to the thought that life is chemistry; since life is movement, and chemistry is the movement of atoms. But the practical conclusion of our philosophy is that we cannot afford to permanently neglect the pharmacological aspect of phthisiotherapy, any more than the mechanical.

A *Comprehensive Comparative Trial* of 26 different forms of treatment in the "hopeless ward" of the Metropolitan Hospital was reported before the New York County Homeopathic Society by M. W. McDuffie.² It included observations in over 500 cases, on the following treatments: Mercury succinimide, mercury bichloride, mercury biniodide, arsenic trioxide, salvarsan, Fowler's solution of arsenic by mouth, mineralization treatment, oils, Sherman's vaccines (letter P), combined bacterial, vaccines (van Cott), Schafer's vaccine or filtrate, Schafer's tuberculosis vaccine or filtrate, Dr. Cocheu's vaccine or filtrate, Dr. Duncan's autotherapy filtrate, tuberculin by mouth, tuberculin injections, anti-streptococcus serum, quinine, baptisia, formaldehyde solution; salicylic mixture, salicin, sodium salicylate, guaiacol, and vanadium. His conclusions are to the following effect: The tubercle bacilli cause less trouble and are more easily eliminated than the complicating mixed

¹ British Medical Journal, May 31, 1913.

² New York Medical Journal, March 15, 1913.

infection. All stages have the mixed infection to contend with. Immunity should be produced during childhood by hygiene. (1) To get rid of the germs: Guaiacol mixture intravenously has given the best results. (2) To make the soil unfavorable for their growth: Tuberculin in early stages; it is of no value in later stages. Vanadium, now on trial, he believes will be useful; making the soil unfavorable for growth in the last stage, possibly in all stages.

Some Recent "Drug Treatments." A. Strauss¹ attributes to a copper-lecithin salve, for injection and inunction, a specific action on bacilli, in external tuberculosis. A. Brashear Jackson² recommends for lung trouble calcium cacodylate and calcium iodide. G. Pedigo³ gets "undoubted" results in phthisis from an ointment of oil of eucalyptus.

Allyl Sulphide in the Treatment of Tuberculosis. John P. Elliott,⁴ who has successfully employed it in pulmonary cases, as well as in a grave tuberculous abscess which had resisted all treatment, calls attention to the "shut away fluid" theory advanced by W. C. Minchin in his "Treatment, Prevention, and Cure of Tuberculosis and Lupus with Allyl Sulphide"; and to his statement that all tuberculous lesions in situations accessible to the application of allyl sulphide are curable. Minchin⁵ believes that amputation of limbs is never necessary, any more than castration in tubercular orchitis, when the powerful emplas-trum he applies has rapidly saturated all the deep tissues. In pulmonary tuberculosis, no treatment hitherto introduced will cure all cases. Minchin regards this as due to the stagnant "shut-away fluid," which protects the bacilli from any germicide or serum, the value of which, therefore, remains untested.

Any treatment of reliable value should exert a specific action on all tuberculous lesions, in any situation accessible to its influence by application. Every accessible tuberculous lesion is readily and permanently healed by the application of allyl sulphide if it does not contain either "shut-away fluid" or a sequestrum.

Minchin finds that fairly early cases of laryngeal tuberculosis almost invariably yield to allyl sulphide when properly applied, and very often late cases. The same applies to lupus, late cases being very slow to heal. Pulmonary cases not improving under this treatment in three weeks cannot be cured without the surgeon's aid; an artificial pneumothorax would no doubt expel the shut-away fluid which he believes must exist in them.

Lysol. J. W. Lane⁶ writes enthusiastically of his results, in the early stages of tuberculosis, with lysol. He had used it first in inunc-

¹ Deutsch. med. Woch., March 13, 1913.

² New York Medical Journal, May, 24.

³ Ther. Gaz., March, 1913.

⁴ Medical Press and Circular, 1912, p. 692.

⁵ Ibid., 1913, p. 274.

⁶ Ibid., November 20, 1912.

tions, then in fine spray vapor inhalations, and now hypodermically. Lysol (pure), 1 dram, and aqua dest., 2 ounces, make about a 3 per cent. solution. One dram of this is injected under the skin around the chest once or twice daily, to be increased every three or four days by 1 per cent. until 15 per cent. is reached. Its effect will be soon seen. If it causes any slight uneasiness, add to each ounce of solution when used, cocaine hydrochl., $\frac{1}{8}$ gr. When 15 or 20 per cent. is injected at each time, this should be only once a day. He exceeded the latter dose. Each puncture should be an inch from the former one. A three-months' course "would show up fully its wonderful effects."

Intrapulmonary Parenchymatous Injections. In our more direct, medicosurgical phthisis therapy of the last fifty years this was an early endeavor and a disappointed hope. History repeats itself; but in our therapeutical revivals there is always *novi aliquid*—at present our antiseptics and our improved technique, possibly, to wipe out former failures. This is claimed by v. d'Amico¹ for his method in Vol. XX of the *Rivista*. He reports in his 22 cases a uniform gradual cessation of fever and cough, a disappearance of bacilli and of physical signs—in short, "recovery." May this prove on further trial the quick as well as the direct way. The best route to the apex for the platinum tipped injection needle is the "second dorsal interspace." In adults, twenty to sixty injections may be needed; but in the two children whom he treated, ten were sufficient. The bulk of the injection is usually 1 c.c., and sometimes, for cavities, 4 to 6 c.c. He relies upon iodoform. His solution consists of: Iodoform, 1 gram; camphor, 2 grams; guaiacol, 5 grams; essence of mint, 30 drops; olive oil, 20 grams. He finds this on the whole more successful than Zambetti's iodized serum, which he has also used.

INTRAVENOUS ANTISEPTIC MEDICATION. *Iodoform and Benzoyl Chloride.* The latest discussion on the main question, raised originally by Robert Maguire's intravenous treatment by formalin and soon after by my own use in pneumonia as well as in phthisis of collargol as a substitute, which was subsequently more widely tried by the French school, was opened on April 4, 1913, before the Royal Academy of Medicine in Ireland, by J. B. Coleman.² The iodoform treatment had been first introduced by Dewar, in 1903, with intravenous injection of half-grain doses dissolved in ether and liquid paraffin (followed by tuberculin and vaccines). In 1911, the intramuscular injection of iodoform and benzoyl chloride dissolved in ether and liquid paraffin, suggested on the assumption of its efficacy in leprosy—which more recent investigation at the Mahaica Leper Asylum in British Guiana proved to be erroneous, was tried unsuccessfully in Steeven's Hospital, Dublin. The further trial of Dewar's original method reported to the same Royal Academy in December, 1912, is the subject of Coleman's

¹ Lancet, 1913, vol. i, p. 910.

² Medical Press and Circular, p. 455.

indictment, which was supported by Walter Smith and Parsons, and contested by Moorhead, Kirkpatrick, and Bewley, who had tried the treatment and found it unobjectionable, and by Crofton, its chief advocate, who referred to experiments on rabbits which had been injected with the bovine bacillus, and when the disease had developed had been completely cured with iodoform intravenously. He also gave a summary of 29 private cases: 6 early cases, apparently cured; 8 second-stage cases, apparently cured; 15 advanced cases, 6 apparently well, 2 very much improved, 7 died.

Coleman's *à priori* objections were as follows. The drug is a weak germicide, not fatal to bacteria, and not *monotropic* for the bacillus. Iodoform is toxic, causing such symptoms as malaise, wasting, anorexia, vomiting, fever, tachycardia, insomnia, delirium, headache, prostration, albuminuria, loss of power in the legs, loss of control over the sphincters, and even death by coma (Treves). It is harmful to the eye; in many instances retrobulbar neuritis had followed its introduction into the system (Critchett, Terson, Priestly Smith, etc.), and after prolonged use, atrophy of the optic nerve had ensued. According to Terson, it causes retinal hemorrhage. In pulmonary tuberculosis the injection is attended with special dangers, as it is liable to be followed by severe attacks of coughing, entailing the risk of hemoptysis or of pneumothorax.

On the matter of principles, Sir Almroth Wright in a report last October, in reference to an inquiry into the treatment of pneumonia by ethylhydrocuprein hydrochlorate (a drug brought forward by Morgenroth for trial in pneumonia), had considered the conditions which ought to be satisfied before applying any drug treatment with a view to killing the causal agents of disease in the infected body. He discussed the relation in which the specific pharmacotherapy of Ehrlich stands to the prescribing of antiseptics, and he pointed out that "it never entered into the conception of the physician" who prescribed antiseptics to require of these that they should be *monotropic* for the causal agents of disease, nor did he appreciate that the affective dose of a therapeutic agent was capable of being determined by blood tests. It is "an indefensible proceeding to administer a drug concerning which we have neither *à priori* grounds for believing that it will, nor evidence to show that it does, do what is intended. And we condemn not only treatment which is based upon notoriously erroneous assumptions, but also treatment which is simple random experimentation." *Mutatis mutandis*, these rules apply to an inquiry in reference to the use of iodoform in pulmonary tuberculosis.

V. General and Special Therapeutic Measures. RAIN-BEARING WINDS AND TUBERCULOSIS. Wm. Gordon, of Exeter, adds a further contribution to his published studies of the question, in the *Practitioner* for February, 1913. His practical deductions are: (1) It is imperative

in choosing a place of residence, for cured cases of pulmonary tuberculosis or for persons of pronounced tubercular family history, to take into account its wind-exposures. (2) It is imperative, in investigating any influence bearing on the prevalence of pulmonary tuberculosis and possibly of other forms of tuberculosis, first to recognize and eliminate the influence of strong, prevalent, rain-bearing winds. (3) It will be wise, in choosing a site for a tuberculosis sanatorium, to take the local wind-exposures carefully into account. (4) It will be wise, in examining farms for cases of bovine tuberculosis, to examine particularly those which are fully exposed to these winds.

THE X-RAYS AND TUBERCULOSIS QUESTION IN SPLENOMEDULLARY LEUKEMIA. Moorhead,¹ in reporting the case of a boy, aged eleven years, greatly benefited after five weeks of a five-minute splenic exposure every third day, who relapsed one month after its unavoidable discontinuance, and died two months later with symptoms of miliary tuberculosis, remarked that in spite of the apparent immediate beneficial effect of the *x*-ray course the rapid termination of the case suggested that possibly the effects of *x*-rays were not really remedial, and that as a result of their use the resistance to tubercular infection in leukemic cases was diminished. This was supported by the records of other leukemic cases under the same treatment. Professor MacWeeney referred to a similar experience in one of his cases. He remarked upon the absence of granular cells which was met with in a great many instances. Ehrlich indicated that a large increase in eosinophile cells was thought to be the most marked feature in leukemia; but he (Professor MacWeeney) was struck with the difficulty of demonstrating such a feature in practice. Hayes also mentioned his observation that there generally came a time when *x*-ray exposure had absolutely no effect, no matter how long or regularly it was continued.

CONTINUOUS INHALATION. Some significant statements occur in a letter, published in the *British Medical Journal* for November 16, 1912, from C. Muthu, who has employed the method for fifteen years in his sanatorium, and who fully endorses Dr. Lees' main contention that continuous inhalation is one of the most efficient means in arresting the disease. "It is in perseverance rather than in any special antiseptic mixture that the secret of success lies. For that reason the treatment in the majority of cases cannot be successfully carried out at home, as Dr. Lees avers. It is not possible to have perfect sanitary and hygienic conditions in every home. Again, while it is difficult for patients to be strenuous in using the inhalation for eight to ten hours a day in a sanatorium in spite of constant vigilance and encouragement, how is it possible for an isolated consumptive with a weakened will, surrounded with adverse influences at home, to carry out the treatment day and night and for weeks and months? Thirdly, it is not continuous

¹ Medical Press and Circular, April 23, 1913.

inhalation alone that is going to arrest the disease. We found that it must be combined with fresh-air treatment and graduated exercise." As regards the inhalants, he writes as follows. "We use two or three solutions each containing three or four antiseptic drugs. We administer formaldehyde in 2.5 per cent., and gradually increased to 5 per cent. strength (in the form of gas, not in watery solution) combined with creosote, terebene, pumiline pine, and dissolved in rectified spirit and chloroform; a pleasant combination. In the majority of cases with no laryngeal complication, formaldehyde used in this way is not at all irritating. By hardening the mucous membrane it is easily tolerated. In other cases, or to give variety in treatment, we also used a mixture of guaiacol, iodine, terebene, pumiline pine, combined with rectified spirit and chloroform. Using the same inhalation, day in and day out, for weeks and months, patients are apt to get weary of the same mixture all the time." We are left to infer that Muthu does not regard the method as an independent radical cure; and further, that even with the most favorable combinations it claims considerable time.

SUBCUTANEOUS INJECTION OF OXYGEN. R. Bayeux's¹ paper gives a detailed account of 7 of his 36 cases, treated during the last year and a half, in which the result was excellent in spite of serious and marked symptoms. Of the remaining 29 cases, 11 suffered from tuberculosis with slight symptoms, and all were cured; 12 were long-standing cases with cavity formation, and, of these, 3 were sent home relieved of their acute symptoms and all the others are on the road to cure after three months' treatment; 2 cases, still under treatment, are not expected to recover, but their dyspnea has disappeared as a result of the injections; 4 cases died while undergoing the treatment, 3 of them having been relieved of their dyspnea, night sweats, and insomnia, while in one the effect was *nil*. Upward of 700 injections were given, without any accident of any kind. He gives an illustration of his portable apparatus which permits of accuracy in the dosage and of exact regulation of the rapidity of the flow; the rate of flow is regulated in liters per hour by means of a graduated disk. If it is necessary to stop an acute asphyxia, as much oxygen as possible is injected in the shortest time possible; but in dealing with a chronic case, the treatment is not always so simple. In the latter type of case the author lays down the following rules: (1) Never exceed a speed of 1 liter in twelve minutes. (2) Rarely give a dose of more than one-half liter a day. (3) In cases of moderate severity be content with an injection every three days, changing the site of the puncture—buttock, lumbar region, external region of the thigh, outer third of abdominal region—with each injection. The amount to be given varies with the age and state of the patient: For infants, 100 c.c.; for children, 150 c.c.; for adolescents, 300 c.c.; for adults, 500 c.c. The graver the condition, the more often

¹ Arch. gén. de méd., September, 1912; British Medical Journal, February 22, 1913.

must injections be made; which is not to say that more gas must be administered, for the writer has observed that slowness of absorption of the oxygen is in direct relation to the gravity of the intoxication, a fact which he has found valuable in prognosis.

The history of the method dates far back. It is on record that the idea of treating phthisis by oxygen originated with Priestley himself. The method of injecting the gas subcutaneously was invented by Spallanzani, who showed that the skin of batracians absorbs more than their lungs, and that the cellular tissue absorbs all the oxygen which is injected into it. Inhalations of oxygen were employed in pulmonary affections in 1780 with good effect, but some bad results caused a violent reaction against them; and their use in phthisis, except as a desperate remedy, was altogether abandoned after 1789. Bayeux was led to adopt the subcutaneous method of oxygenation by the good effects which he had obtained from it in dyspnea. The first case in which I injected oxygen subcutaneously some years ago was a case of advanced phthisis. The purpose was to relieve the dyspnea; but the possibilities of the method as a systematic curative treatment did not then occur to me.

As bearing upon the general and practical aspects of the question, we may mention C. F. Licht's¹ recent clinical experience of the analogous method of *intramammary injections of air* for the relief of eclampsia, which was completely successful as regards the suppression of the attacks, although one of his three patients did not eventually recover. His method was based on the observation that an afebrile disease which occurs in cattle before, during, or after calving time has for some years been successfully treated by distending the udder with air, injected by a bicycle pump. Its symptoms are paresis, loss of consciousness, and in some cases cramps. Originally the disease often ran a fatal course, but after Schmidt, in 1897, introduced the treatment by injection of a solution of potassium iodide into the milk ducts, it became easy to cure, and lost its dangerous character. Now the potassium iodide has been replaced by air, the effect of which is so rapid that veterinary surgeons boast of giving an injection, retiring to smoke a pipe, and when this is done, finding the cow already cured. This result is attributed to the destructive action of air upon toxins in the udder.

In Licht's first patient, who died of sepsis and renal disease, 300 c.c. of air were injected into each breast at five or six different points, as it was impossible to pass the needle's point directly into the milk ducts. During this procedure another attack occurred. This was the last. Sixteen hours after the injections were given the mother was delivered of a dead child. A few days later the temperature began to rise, and death occurred thirteen days later. In the second case,

¹ Ugeskrift for Læger, July 18, 1912.

200 c.c. of air were injected into each breast with complete success, and in the third a total volume of 900 c.c. was introduced. The reabsorption of the air occupied from eight to fourteen days. Licht regards the procedure as perfectly safe under all technical precautions. He attributes the striking success to the air injected, as little of the saline infusion had been absorbed when relief was obtained.

A passing reference may be made to H. Schmidt's¹ further report of his successful use of the gastric, duodenal, and rectal administration of oxygen for the sake of checking putrefaction and fermentation, and of promoting the cure of catarrhal conditions and of dyspepsia, including infantile dyspepsia. While claiming for the method a surprising efficacy in the milder catarrhal affections of the intestine, he has not been able to make any impression upon destructive lesions such as those of ulcerative colitis.

THE TREATMENT OF HEMOPTYSIS IN TUBERCULOSIS is now based, according to T. Frazer,² upon definite principles, the first of which is the reduction of blood pressure. This alone may suffice in the slighter cases, and in the premonitory stages, under the frequent internal administration of nitroglycerin, or of sodium nitrite. In the emergency of a sudden hemoptysis, the paramount indications are absolute physical rest, mental reassurance, and a rapid reduction of the blood pressure. For the latter, after the two first have been attended to, Frazer recommends the immediate inhalation of amyl nitrite, and the injection of $\frac{1}{50}$ grain of atropin, perhaps to be repeated two or three times in twenty-four hours, or of $\frac{1}{100}$ grain of nitroglycerin, which should be repeated for three or four doses every half hour or hour, and afterward less frequently. Internally, 1 grain of sodium nitrite every three or four hours will keep up the vasodilating effect. Morphine should not be given as a routine, though always indicated where there is much nervous irritability. The heart's action may also be quieted by a light ice-bag over the precordium. Frazer believes that the aperient dose formerly insisted upon is best delayed for twenty-four hours, to spare the patient any avoidable exertion during the acute stage. The diet should be restricted at first to small supplies of milk and of egg-albumin; and the patient should be kept in bed for at least one or two days after all trace of blood has finally disappeared from the sputum.

THORACIC PRESSURE AND RELATIVE UNILATERAL BREATHING IN THEIR TECHNICAL COMBINATION FOR DIAGNOSIS AND TREATMENT. *Pulmonary Compression and Unilateral Breathing* are the linked agencies called to aid in the great cure of Carson and of Forlanini. The compression, *qua* relative rest for the lung, is in itself a genuine installment of local direct treatment. It fulfils at the same time the hardly

¹ Therapie der Gegenwart, January, 1913.

² Medical Record, November 9, 1912.

less important office of procuring the indispensable advantages of unilateral breathing. It is the means to that end.

Thoracic compression, an attenuated degree of the same influence, can achieve much less curative effect of its own, even when applied continuously either locally as in Piorry's method, or to the entire half of the chest as in that of Tidey. But it has the advantage of being always available as a means to unilateral breathing, which is inseparably linked with it; and it is capable of being graduated to any degree of tolerance. Technically, this affords us opportunities which have not yet been turned to systematic account for treatment; but which have been in constant use for systematic examination of the chest. The bilateral manual test for the bilateral evenness of the thoracic excursions is most instructive. The element of pressure has to be carefully excluded. Strong pressure applied unconsciously to one side paralyzes that side, and sets up increased action on the other; if slight only, the effect is confined to the same side where it acts as a local stimulus, and rouses the lazy muscles to greater activity. This illustrates the delicacy of the pressure method we are suggesting, and its capability for unlimited graduation to suit the treatment of the most sensitive subjects. It is essentially a method for graduated adaptation, both in degree and duration of pressure, and in its point of application. In all these respects it is the opposite of the continuous non-graduated methods referred to above.

The individual response to unilateral pressure in terms of unilateral breathing on the opposite side is extremely variable. From extensive observations I have arrived at a definite conclusion that any pulmonary delicacy and any lesions raise it considerably, thus adding to the working efficiency of the method, but also to the need for its most careful regulation.

The Uses of Relative Unilateral Breathing, and the Question of Decubitus. Day and night, for work and for rest, unilateral breathing is in constant request, as a universal means to many ends. We have too long neglected to inquire what it might achieve for our vital ends. It is excusable to repeat that the wished-for completion for all our phthino-chested is to develop in them, if possible, some of the apex peculiarities of the emphysematous; not, of course, for fixation, but for improved active range. If this can be achieved, it is our duty to begin in good time, and to use the best means. The therapeutic uses of unilateral breathing are the most vital of all; and nature provides by lateral decubitus that they shall not be entirely neglected. This is available in the cradle, and remains available through life. Its therapeutical aspect is "due alternation." Enough has been said to show that bilateral breathing can do much. But it cannot "lateralize" the upper spine, nor search its costal articulations and the first cartilage with the same degree of strain as that from unilateral breathing. It

is inadequate for our plastic purpose in mechanical prophylaxis. The other side of unilateral breathing is the temporary relative disuse of one apex; and that is the indispensable means to the end in view. This opens up a great question which we are apt to deal with too lightly. The familiar inquiry "Does it matter which side we sleep on?" is not irrelevant. It is usually discussed in terms not of the apex, but of the heart, the stomach, or the liver. It certainly matters little "under level alternations." But in the deep sleeps of our phthisis-threatened youth it cannot be immaterial to restrain for eight consecutive hours the aëration of one of the apices. As the circumstances which govern our preference are usually permanent, be it the "wall," the "light," or any other, that preferred decubitus may occupy one-third of our daily life; it becomes a serious question. I have failed to imagine any other more plausible solution for our two etiological mysteries, the unilateral individual incidence of apex disease, and in the race the bilateral evenness of that unilateral incidence. It might also fit in, in view of the frequency of leftward mobility of the heart with sensitive apex beat, with the statement of some statisticians that the right apex is rather more frequently the first to suffer. The question as it stands is worth investigating, but meanwhile for safety it is best to recommend the early cultivation, for "prophylaxis," of an even facility and of a systematic alternation, for right and left decubitus. As part of the "treatment" of the disease, decubitus is an entirely separate subject which we cannot attempt to discuss briefly.

Assuming that it is capable of great benefits, unilateral breathing is so familiar in its unconscious performance that its purposive practice is merely a question of attention and of will. But as we cannot, in most cases, depend upon them, it is practical to work upon the "unconscious" plan and that of least effort, by providing a help such as the chest-clip, which renders it automatic.

OUR FUTURE THERAPY. Our future therapy has yet unknown space to span between two great pillars; the growing clinical work of our bacillotherapy, and the solid, full-grown structure of Nature's mechanical cure. Together they should afford ample support for an unlimited *prevention*, and a widely efficient *early treatment*. Outside of those achievements, and for any henceforth diminishing emergencies, our "heroic surgery" is already available. But, by the time it is no longer wanted, it may probably have added to its thoracic, to its pleural, to its pulmonary, and to its vascular branches, yet another development, the most direct and, for mere rational speculation, the most plausible of all—along the great open physiological way to the seat of mischief. *Bronchial surgery* was impossible; but that clause has been ruled out by Carrel. Carson's compressed lung might be regarded almost as an easy surgical quantity to handle, the first stage to many impossibles, and among them to bronchial toilette by immediate drainage, aspira-

ion, and aseptic irrigation. Lung cleaning has always been wanted, and there is but one way for it, down the bronchi. Schmidt has recently shown us the line of access, but that first step would be much easier in the compressed lung, without the obstruction of lung retractors. As a first stage operation, induced pneumothorax has a much greater surgical future than for late phthisis, almost the last of all *à priori* conceivable indications. Moreover, it has other medical uses in pleural as well as pulmonary affections, and Quincke has used it successfully for the repeated relief of intense pain from pleuropulmonary cancer.

OUR PRESENT OPPORTUNITIES. The practical studies we are trying to invite, were suggested by the success and by the risks of Carson's method at the hands of Forlanini. Why take the risks if we can secure the benefit without them? Why delay the benefit if it can be safely obtained at the earliest stage? For that early treatment the "mechanical method" now proposed is an attenuation of those agents of unilateral pressure and of unilateral expansion, which have been found fairly safe at the precarious stage, for earlier stages much more propitious and tolerant; it is therefore a plausible proposition. Its objective is not any damaged chronic lung; but only the slight damage of Forlanini's "working lung," with a perfectly intact second lung to the good. In those conditions the carefully graduated application of the chest-clip, so amply tested as to safety by constant use in diagnosis, does not entail any major innovation, and seems to be worthy of adequate trial, with the prudent clause of a preliminary "institutional" study of its effects under the constant observation of competent specialists.

But the much greater field for this method even than early treatment, is *prevention*. This has been suggested not only by Forlanini's achievements, but by those of Nature in her mechanically apex-immunizing affections. Here the question of risk vanishes, and the chest-clip is merely a convenience for the immediate production of unilateral breathing and for the demonstration of the simple methods by which it can be otherwise obtained. The immunizing value of unilateral breathing, also most valuable for the neglected early cure of scoliosis, lies in the apex benefit, most easily secured at the plastic age by a systematic alternation right and left of the chondral costal, and costovertebral benefit which nothing except unilateral breathing can possibly effect, and which no other method can possibly establish permanently with the same rapidity. Its systematic employment at schools as part of the regulation drill would quickly follow upon an official inquiry confirmatory of its results, by accurate chest measurements.

THE CHEST-CLIP. The appliance is still in its rough experimental stage, open to any improvement in its shape and in its light mobile pads for spinal and pectoral application. Its general shape is distantly

that of the paper-clip, an elongated "horse-shoe." Its ribbon-spring is made of varying thickness, and of varying width up to one and one-half inches. It can be worn over the clothes or under the coat. Piorry had borrowed a similar pattern from the hernia truss; I became first acquainted with his priority only one week before the date of my paper. His idea was to increase greatly the power of the hernia spring, my own is to reduce the pressure of the spring to the utmost degree compatible with efficiency. The same applies to the duration of the applications. I have worn it experimentally for hours without any inconvenience, whether at rest or under exertion. I was surprised to find that even shorter applications led to a remarkable persistence of the unilateral type of respiration they had brought about, and, moreover, that the individual chest is easily taught, under its demonstrations, the trick of spontaneous respiratory asymmetry. This was an important revelation for practical therapeutics, inasmuch as the method is shown to be capable of a non-instrumental form. Nevertheless it must always remain of definite use for the greater number of our untutored patients, till they learn the art of self-help.

PHYSICAL DIAGNOSIS

The Principles of Percussion and Auscultation. Any devoted student of physics will find much to interest him in Professor Friedrich Müller's paper in the *Lancet*.¹ We cannot enter into the theoretical aspects, but only quote some practical points. "The dulness of pulmonary infiltrations or of effusions has not only a small amplitude or intensity of vibration, but also a deficiency of the lower tones such as the pulmonary, which always have a longer duration than the higher ones. The ears of many physicians being specially adapted to perceive durations, they use the expression "short" instead of "dull," not without good reason. In beginning tuberculosis the percussion sound of the apex affected shows at first only the deficiency of the lower tones, and therefore appears *in toto* higher and shorter. A difference in amplitude or "loudness" is scarcely or not at all perceptible in early cases. A distinct loss of amplitude—*i. e.*, "real dulness or flatness is a sign of more intense infiltration." Concerning bronchial breathing he says: "Real bronchial breathing, as heard over dense pulmonary infiltrations or over totally compressed lung as at the upper part of the pleuritic effusion contains only high tones, exactly resembling the sharp *ch* sound of the German language. Tracheal breathing differs from it in being mixed with the low sound of vesicular breathing. Again, cavernous breathing is a different quantity; generally possessing a lower pitch than bronchial breathing which later seems to originate

¹ Vol. i, p. 674, 1913.

only in the larger bronchi of the first, second, and third order." He finds that "a comparison between percussion and auscultation results, and those under the *x*-rays, or at the autopsy, shows that we have to be very moderate in our diagnostic conclusions from the physical examination, which does not grant so conclusive a proof of the internal condition as many of us have imagined."

The Acoustics of Stethoscopes. Professor Hy. Sewall calls renewed attention in the *American Journal of Medical Sciences* to the limitations of the binaural stethoscope, in spite of sound-magnifying devices in the chest-piece, when it is solely dependent upon aërial sound conduction within india rubber tubes deprived of any rigid conductor for the solid vibrations. The wooden or metallic stethoscope collects and conducts the latter; the other can only conduct the sound-waves emitted from the vibrating patch of skin under the chest-piece and from the internal surface of the cup. The main point is that more or less of stethoscope pressure applied to the chest modifies the tension of the surface like that of a drum, and therefore its capacity for transmitting vibrations of different pitch. The greater the pressure so much greater the tension of the chest wall, and therefore the damping of those vibrations which are of deeper pitch.

A Sound Grasp of the Acoustics expounded by Professor Müller is indispensable in the teacher and in the investigator, and of value to all of us as a help. Happily, however, there is no need, for the everyday purpose of the clinician, for any advanced study of the pure physics of auscultation and percussion with tuning forks and resonators. As with any other language, our understanding of the utterances of the stethoscope or of the pleximeter is based upon soundness of hearing or of touch, and upon a personal familiarity, more quickly to be acquired by those who not only can hear but *know how to listen*, with each of the characteristic sounds. Success with the dividing rod is independent of any theory as to its mechanism; it is most often the privilege of the uneducated. Likewise the recognition of any sounds *sui generis* such as the blowing expiration from the bronchioles, the bronchial breathing from the larger tubes, and the cavernous breathing from a vomica, might be learned by any lay listener ignorant of anatomy. The great *art* is concentrated attention; and the main *principle* is differentiation.

The significance of that principle is not generally understood, particularly in the more difficult sphere of percussion. The fine uses of percussion are not so much in determining whether the note is of slightly higher or of slightly lower pitch or amplitude of vibration than the adjoining note. The main point is to ascertain whether the two areas respond in the same manner or in a different manner to the stroke; and this cannot be fully ascertained until we have searched them with the three powers, "light," "medium," and "heavy," not only with the stroke of the right finger, but—this being more essential though seldom

impressed upon students—with *the pressure of the left finger*. For any critical percussion this involves six strokes, each of them of different value. The modulation of the pressure of the pleximeter or of the left finger is the main agent in detecting a deep-seated difference, or not overlooking through the use of too much strength that which lies at the surface. The secret of the “Schwellenswerth” (or “liminal” percussion, bordering on the inaudible), which has obtained its late recognition and systematic teaching from the German school, was demonstrated in our polyclinic long ago, as well as its further degree “the inaudible percussion” which I ventured to describe as “the percussion for the deaf.” For its success, however, scarcely enough stress is usually laid upon the necessity for always combining with the lightest of strokes a sufficient “firmness of pressure”; this should be never rigid, but elastic; and finely varied.

Direct Percussion. Another very useful method for the rapid general survey of the chest is the direct *one-finger percussion*, with a very light wrist. Each of the light strokes finds the muscles relaxed, and free from the artificial dulness of contraction. If skilled, it should not be painful, as relaxed muscles are not tender, although in cramp they are exquisitely so. In a moment we can ascertain by this method whether a lung is sound or solid, and whether the pleura contains fluid or lung only. It is also capable, with sufficient practice, of much finer indications. One of its advantages is that it lends itself to the simultaneous stroke on the *bimanual plan*, for the sake of finer comparison. Ambidexterity is a great asset here. Its cultivation should belong to the elementary schools; but to us it is of professional importance. It ought to be given prominence in the early curriculum, instead of being restricted as an after-thought to the advanced student of surgery and of the specialties.

The Mechanical Factor in Chest Diagnosis. RADIOSCOPY is at its best, for purposes of apex tuberculosis, as a positive test for massive changes. It cannot give us the shadow of a solitary tubercle, any more than a negative sputum examination can prove the absence of bacilli. For earliest diagnosis we are still largely dependent upon our old physical methods, because they combine, with their even greater weakness in negative conclusions, the more conclusive observation of the disturbed mechanisms of function. Palpation and percussion are entirely mechanical. Throughout, the mechanical factor prevails, from the fundamental law to examine “back and front,” to the technical refinements of immediate and mediate percussion, digital and pleximetric, sporadic or symmetrical, simultaneous or rapidly comparative, etc., down to the “percussion for the deaf” long ago described before the London Polyclinic while Goldscheider was elaborating his excellent “Schwellenswerth” method. Happily its highest expression in the shape of tuning forks and resonators is not practically needed.

Auscultation, too, is partly mechanical, more largely even for the patient than for us, as may be gathered from the recent subject of "Conducted Crepitations" discussed in the paper published last year¹ on "Perez's Sign and Audible Motor Crackles," but much more from the yet unpublished diagnostic method by "unilateral breathing" briefly referred to in these pages. This brings us to an important development of our early diagnosis by physical signs.

THE ESTIMATION OF RESPIRATORY ASYMMETRY. This is, in the majority of cases, the earliest requirement. Respiratory asymmetry is suspicious always. In the prophylactic overhauls for soundness, which should be much more the rule for physicians than they are for dentists and an indispensable duty under "School-inspection," it is practically the first to arouse suspicion. It is exceedingly common; most obvious in front, but too little studied at the back, where the diagnosis resides in the behavior of the spine. Happily, it is not always linked with any serious threatenings. What is usually observed at the pectoral region is relative inextension, some flattening, some imperfect resonance, or even perhaps some localized patch of relative dullness. All this is anxious, and its correct interpretation of the first importance. The apex may be crippled by pleural or pulmonary disease; the alternative explanations for the appearances and for any blowing respiration are general functional inextension, or localized "focal atelectasis"; these, however, may themselves disguise the presence of some small deposit, and that is the main difficulty. But the posterior examination, more vital by reason of the mainly dorsal situation of the apex is much less easy. Auscultation is more distant; but above all we lack altogether the evidence from inspection or palpation, as to relative mobility. The ribs are practically immobile though the lung moves within them. Some means is required for gauging its movement. I owe to a careful study of the dorsal percussion work of the Minerbi's, fully reviewed last year, the elaboration and the results of the method recently published² under the title of "A More Systematic Dorsal Apical Percussion; The Oval Interspinous Dullness as an Aid to Early Diagnosis." The novelty of the matter necessitates some detail in its exposition, but this may be minimized by explanatory diagrams.

I. *Introductory Anatomical and Clinical Remarks.* The apex itself at its extreme tip projects anteriorly under the dome of the pleura; but the greater bulk of it is posterior, and fits into the upper end of the spinal groove. The apices of the lower lobes are exclusively dorsal. Clinically, the lower apices have long been recommended for searching dorsal examination in addition to the upper ones. In all of them the early foci, which may occupy any situation, usually occur at a moderate depth under the pleura, and in that sense are subapical. As it is paramount in early diagnosis and prognosis to decide whether any audible

¹ British Medical Journal, vol. ii.

² Ibid., October 12, 1912.

rales are confined to the upper apex or extend also in the lower apex, strict attention to lobar anatomy is essential. The dissimilarity in the level of the right and left lower lobes should be borne in mind, and their outlines accurately traced according to the only reliable guide, that of the spinous processes.

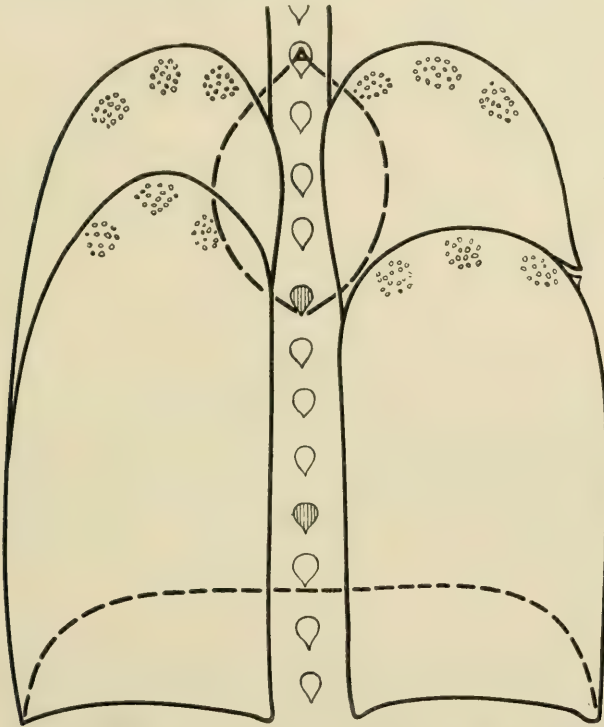


FIG. 1.—Dorsal diagram of the lungs, and spinous processes, showing the levels of the oval patch, of the diaphragm, and of the right and left lower lobes and of their early apical lesions. Right upper lobe tilted up at the side to show the axillary angle of the middle lobe. The oval dulness begins at the first dorsal spine (A) and ends at the fifth.

The percussion resonance of the spinous processes calls for a brief explanation, and a separate diagram. As a median strip of resonance it extends continuously from the cervical spines as far as the fifth dorsal spine, which is always distinctly dull, and serves as our lower landmark.

The Technique. The use of a Sansom pleximeter is indispensable. To save time, there is an advantage in using first the long flange to obtain the general outline, and afterward the small flange to confirm or to correct that rough sketch. The latter is to be used exclusively for the percussion of any small surfaces, such, for instance, as the spinous processes.

The patient under examination is to be seated, with head inclined forward, arms crossed, hands applied to the back of the opposite shoulder-joints. No reference should be made to his breathing. The easiest plan is to start the outlining (Fig. 3) above where the right and the left lines meet at an angle (a), and then to make out likewise the lower angle (v). This helps us to follow the boundary of dulness along its intervening curve.



FIG. 2.—Dorsal diagram of the trachea and upper dorsal spines, illustrating their pleximetric conduction of the tracheal note, also the asymmetry of the infratracheal patch which conveys the dulness of the infratracheal glands and of the right pulmonary artery.

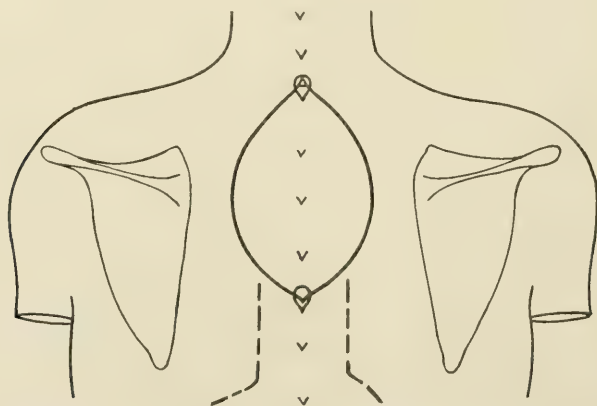


FIG. 3.—Clinical diagram of the oval interspinous dulness, as percussed during tranquil breathing, showing it to be the "upper mediastinal" continuation of the retrovascular dulness.

The Normal Size of the Oval Patch at Rest. The intensity, the precise shape, and the measurement of the dulness vary slightly with the individual, but normally the two latter are fairly constant. For the average adult stature the vertical measurement between the first and

the fifth spines is about 110 mm.; the transverse equatorial diameter about 90 mm., being twice the distance between the middle line and the lateral outline, which is the same on both sides. The inspiratory oscillation is a much more variable quantity. In normal individuals it is greatest in the juvenile type, and among the abnormal in those who have developed the upper dorsal type of breathing.

The Normal Respiratory Variations. Deep inspiration causes the dull area to shrink toward the spine. To show this the long flange of the pleximeter is placed inside the oval patch accurately along its boundary line, and kept there for alternate percussions, while the patient is directed to take a deep breath and hold it, and next to empty the chest and stop breathing for a moment. The note and the tactile vibration will vary with each respiratory phase in the manner stated.

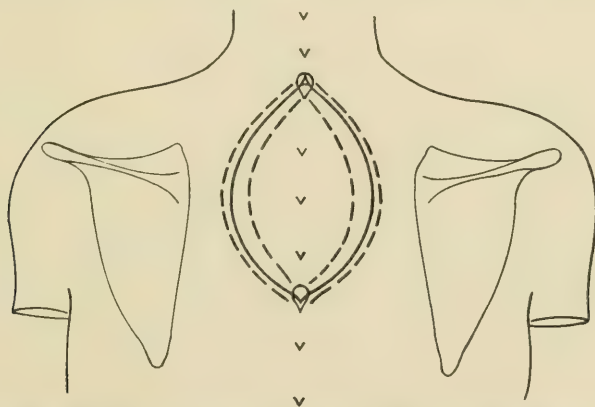


FIG. 4.—Same as Fig. 3, showing in broken lines the respiratory oscillations of the oval outline during active breathing—namely, the slight outward extension of the dullness during expiration, and the inward extension of the resonance during inspiration.

With a little practice the percussor will be able to determine the horizontal extent of the inspiratory encroachment of resonance toward the spine, which in thin, active chests is sometimes considerable.

II. *The Method as Applied to Pulmonary Diagnosis.* Two distinct questions arise in every case: (1) At rest, is the oval interspinous patch normal in symmetry, in length and breadth, in the regularity of its outline, and in the absence of any encroaching adventitious dulness? (2) In active breathing, is the respiratory play normal in every way, symmetrical on both sides, and evenly regular at every level on either side?

Overinflation, as a temporary and functional condition, need not be coupled with any emphysema.

In some varieties of asthma, the question may arise whether there is any genuine emphysema or only functional overexpansion. The

oval patch may give a conclusive answer. The tracing described in Fig. 6 is an illustration of the "juvenile type." The striking amplitude of the respiratory excursion affords proof that the structural changes of emphysema are practically absent, that the lung has preserved considerable elasticity, and that the condition is one of unusually active inspiratory hyperpnea, partly of obstructive, and largely of nervous, derivation.

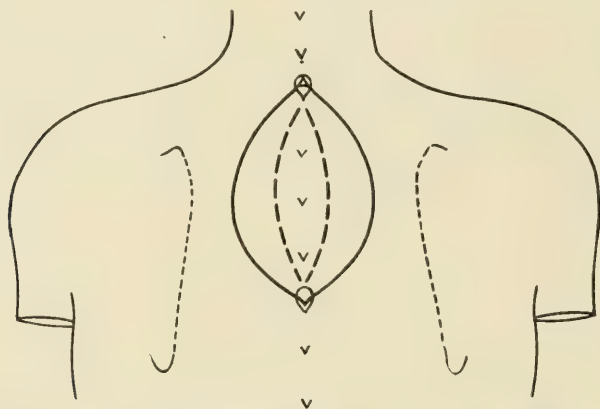


FIG. 5.—Simplified clinical tracing from a case with unusual degree of inspiratory shrinkage of the oval dulness in deep breathing, as apt to occur in the "juvenile type" and in inspiratory hyperpnea.

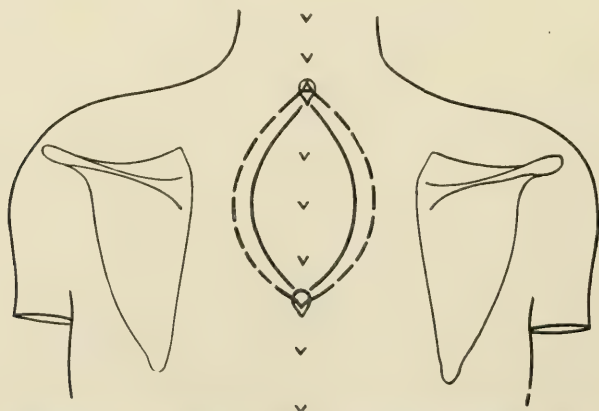


FIG. 6.—Tracing from a male patient with chronic dyspnea and signs of emphysema. Shrinkage of the oval dulness from habitual pulmonary over-inflation: restored to the normal size by expiratory treatment.

In emphysema the oval patch presents, as shown in Fig. 7, the following characteristic features: (1) Symmetrical shrinkage in all its diameters, chiefly in the transverse; (2) blunting of its angles; (3) marked lowering of the upper angle toward the second dorsal spine,

with less marked rise of the lower angle above the level of the fifth; and (4) more or less restriction of the horizontal respiratory oscillation of the outline.

Pulmonary Inexpansion, General and Unilateral. General and symmetrical inexpansion occurs in any form of physical lethargy, and in the asthenic, shallow breathing of pretuberculosis. But our diagnosis is specially concerned with the *unilateral expansions* induced by pleural and pulmonary affections. Any kind of interference with respiratory freedom on one side only will diminish both the air fulness and the air traffic or "ventilation" at the apex. That half of the oval dull patch will therefore be larger than the other, and its to-and-fro respiratory excursions smaller. At the other apex, compensation will tend to increase both the permanent aëration and the ventilation, and its dull patch will be smaller with larger excursions. The causes of the

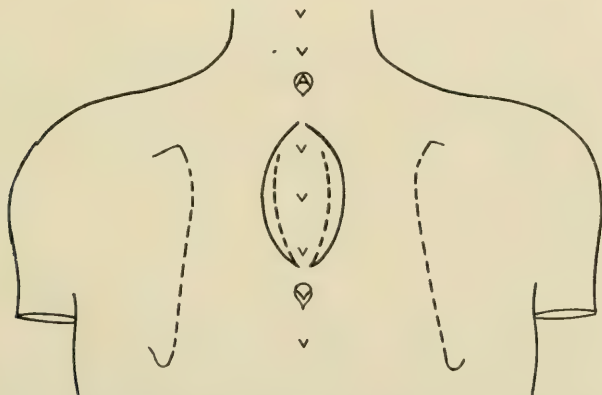


FIG. 7.—The oval dulness in emphysema. Great shrinkage of the dulness, with diminished inspiratory oscillation.

unilateral impairment of breathing may be: (1) Thoracic, (2) pleural, (3) bronchial, or (4) pulmonary; my tracings afford illustrations of each. They may act upon the respiratory mechanisms of the apex, either locally or from a distance, as, for instance, in basic pleurisy. And, again, most of them may be either permanent, as in cicatricial bronchial stenosis, fibrous adhesions, or pulmonary cirrhosis, or merely temporary.

The thoracic group of causes is complex; they may be connected with nerves, muscles, joints, or bones. *Innervation* has a wide field of influence because of the respiratory triad of automatic, reflex, and volitional breathing. An almost purely nervous interference is witnessed in hemiplegia, where Hughlings Jackson observed and explained the presence of a greater respiratory activity on the paralyzed side during quiet breathing, and its transfer to the sound side as soon as

the effort of the will was thrown in. A purely *muscular* interference is witnessed in intercostal or phrenic rheumatism. The familiar disturbances connected with the various lesions or affections of the joints, ligaments, cartilages, and bones of the spine and of the ribs need only to be mentioned.

Again, thoracic space may be unevenly encroached upon as in pleural or pericardial effusions. Pneumothorax, however, would have the opposite effect, that of obliterating instead of enlarging the dull interspinous area. Cardiac hypertrophy and dilatation, glandular swellings, neoplasms, and below the diaphragm enlargement of the liver or of the spleen, and gastric or intestinal inflations or tumors would all tend to increase the area of dullness on the side of the interference with pulmonary expansion.

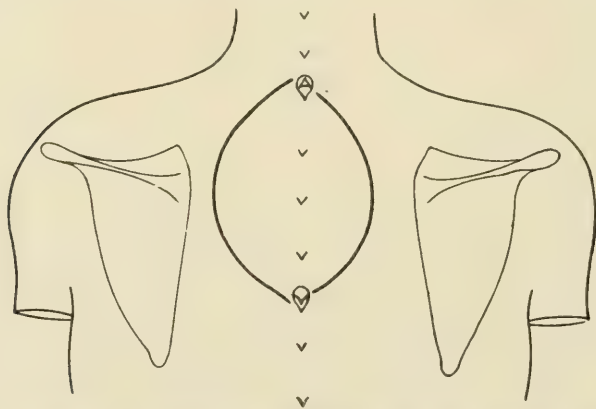


FIG. 8.—Tracing from a small child in whooping cough, showing increased size of the left dullness from left pulmonary inextension, due to more severe bronchopneumonia on that side. Illustrating the *pulmonary* derivation of deficient expansion.

The large group of the localized bronchial and pulmonary affections includes varied forms of asymmetrical obstruction to the passage or to the admission of air into the alveoli, by bronchial stenosis, or by pulmonary disablements ranging from Corrigan's cirrhosis down to simple localized pulmonary congestion.

Lastly, in addition to the behavior of the respiratory mechanism, apical expansion and the oval patch are subject to the influence of the mediastinal factors. For example, the effect of esophageal disease or diverticulum, or of an aneurysm of the arch, is to amplify the dull patch, not only by encroaching upon breathing space, but by increasing the size and dullness of the mediastinal structures.

Simple unilateral "apical" inextension, much more common in non-tuberculous young subjects than is generally suspected, is often

overlooked in ordinary dorsal percussion because involving only a slight subresonance of the apex as a whole, without any striking localized dulness. "Lobular" atelectasis—that is, localized pulmonary collapse—is much more noticeable. It has to be carefully diagnosed from early tubercle. The test for an atelectasis, say at the left apex, is easily applied. The left half of the oval dulness having been traced out as definitely larger than the right, it will be found that after a few deep breaths its size, when determined again after an interval of quiet breathing, will have diminished perceptibly, though it may not have become quite identical with that of the right half, while the suspicious patch of dulness at the apex may have completely disappeared.

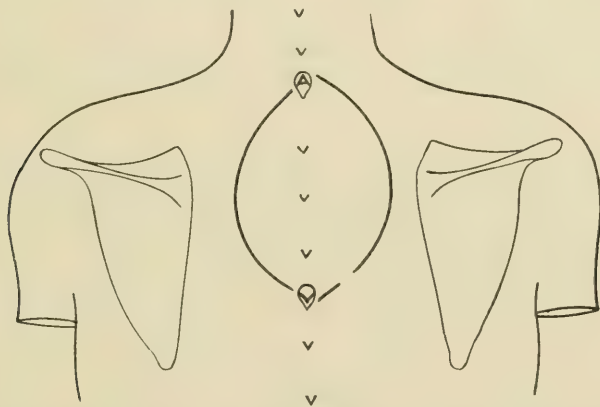


FIG. 9.—Tracing from a boy, aged eight years, with right acute tubercular pleurisy and effusion, causing diminished pulmonary expansion and increased size of the oval dulness on that side. Illustrating derivation of apical under-expansion from basic pleurisy.

The Influence of Unilateral Basic Pleurisy. The diminution in the inflation of the apex on the side affected is illustrated in Fig. 9. The width of the right half of the dulness, corresponding to the side of the respiratory impairment, is much increased; that of the left half is reduced, owing to compensatory respiratory activity.

The Influence of Adhesive Apical Pleurisy. This is well shown in the tracing (Fig. 10) from a lad, aged fourteen years, free from active pulmonary symptoms, but in whom a laparotomy had revealed the presence of tubercular peritonitis. A well-marked dulness, without any rales, extended outward from the margin of the oval patch toward the left supraspinous fossa. The right half of the patch was normal, and oscillated freely with respiration; the left was widened, and there was no oscillation of its outline, in confirmation of the diagnosis of a thickened and adherent pleura. This condition will be frequently found on examination in cases of chronic fibroid phthisis, where the old lesions have led to dense adhesions in the spinal groove.

Pulmonary Tuberculosis. 1. *The Early Diagnosis.* The chief value of the method is the help it affords us at the earliest stage, prior to any possible identification by adventitious signs, or by the bacillary

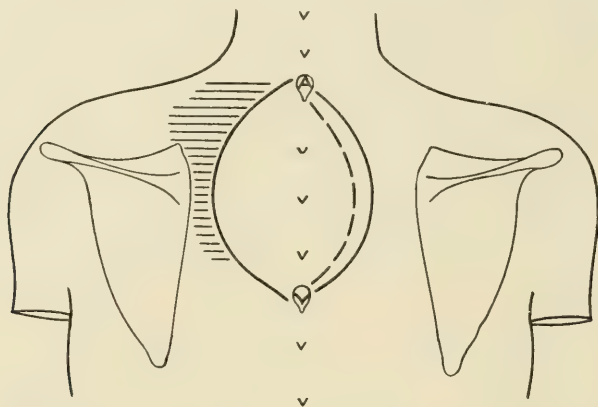


FIG. 10.—Tracing from a lad, aged fourteen years, with tubercular peritonitis and pleural adhesion at the left apex. The left oval dulness is widened, and there is complete left suppression of the inspiratory oscillation, which persists on the right side. Illustrating apical inextension from local adhesions.

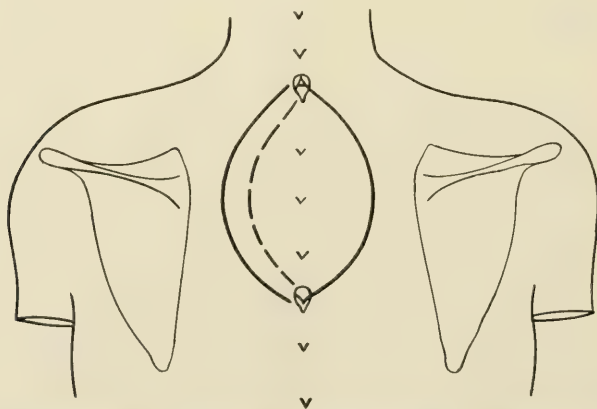


FIG. 11.—Tracing from a man, aged fifty-two years, examined for suspected phthisis. Deficient expansion on the left, with widened oval dulness, due to habitual gastric inflation. No other physical signs. Absence of phthisis diagnosed from the 15 mm. shrinkage (broken line) of the dulness to a 10 mm. smaller size than that of the right, as an immediate effect of corrective respiratory exercise

test, in estimating the significance of doubtful indications, such as unevenness in apical expansion, and in the quality of the respiratory murmur, which often simulate incipient phthisis. Here are two cases in point:

The tracing (Fig. 11) is from a medical man with rapid loss in weight

and strength after influenza. There were no adventitious signs, but only slight loss of resonance at the left apex. The oval patch was markedly increased on that side. By suitably hindering the respiratory play of the sound side, while deep breaths were taken, the asymmetry was completely reversed, as shown in the interrupted outline, proving that the original inexpansion was not due to pulmonary or pleural causes, but was a mechanical result of the gastric inflation which I had suspected, and was able to identify and to remedy. The alteration immediately brought about in the oval patch, and shown in Fig. 11, is the converse of that described in Fig. 6.

In juvenile cases I commonly find that the cause of the unilateral inexpansion and diminished apex resonance is a latent functional spinal curvature, and that the suspicion of phthisis can be eliminated.

The "attitudinal" causation of an apical asymmetry can be identified in many cases by applying the respiratory test to the oval patch.

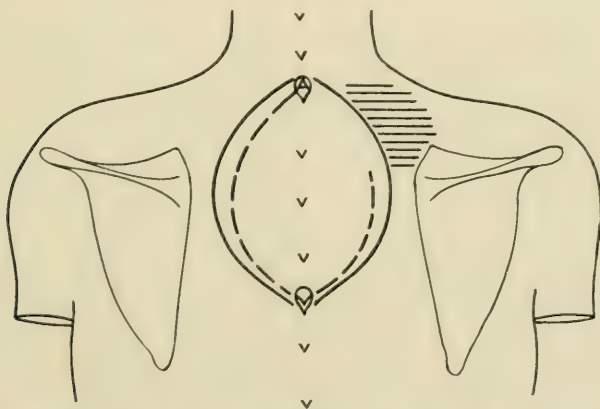


FIG. 12.—Tracing from a female patient, aged thirty-two years, with right apex lesion at inner suprascapular fossa, locally immobilizing the oval patch with local suppression of the inspiratory oscillation, which still obtains below and on the left side.

2. *The Study of the Active Lesions in Progress.* The method yields valuable information as to the position and extent of the local mischief, in connection with any local irregularities in outline, and in range of respiratory oscillation; and of any local encroachments upon the sub-resonant dulness by major dulnesses. These may be due, perhaps, merely (a) to atelectasis, but more commonly to permanent lesions, either (b) of the pleura, or (c) of the pulmonary tissue.

Focal atelectasis, simulating a structural lesion, might have its seat within the oval patch; and, as elsewhere, it would be identified by the evanescence of its dulness under deep breathing. Although each tubercle has its atelectatic areola, a complete return of resonance is sound proof that any veiled lesion could only be minimal.

Local irregularities in the outline of the oval patch are mainly of two degrees: by local immobilization and by local encroachment. Local immobilization may occur at any part of the outline. It contrasts with the complete immobilization of the entire outline depicted in Fig. 10, but its causation is the same or similar—namely, either simply pleuritic from adhesion or pleuropneumonic from tubercle. One of my tracings (Fig. 11) shows it at the upper part. The inspiratory excursion which occurs elsewhere is suppressed locally where the dullness borders upon the outline of the patch. As the condition depicted was not altered by deep breathing, it was not due to atelectasis; moreover, a few rales were audible. In another case, with precisely similar changes at the lower two-thirds of the oval, where excavation had been diagnosticated two years previously, there were no rales, and the harsh, blowing inspiration confirmed the diagnosis of local pleuropulmonary thickening with loss of expansibility.

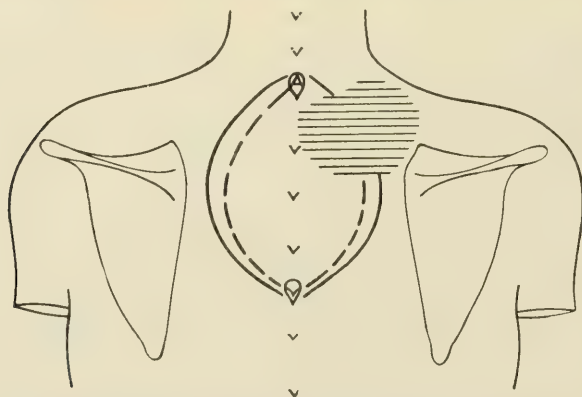


FIG. 13.—Tracing from an adult female patient with active phthisis. The major dullness of the lesion extends into the oval patch, locally obliterating its outline and suppressing its inspiratory oscillation, which are both present below and on the left side.

Local encroachment of an apical dullness, extending into the oval area, is illustrated in Fig. 13 from an active stage of phthisis. The finer analysis special to our method is not needed for the recognition of late lesions, but will assist their accurate delimitation. Its chief purpose is that of early diagnosis.

III. *The Early Method as Applied to Upper Mediastinal Diagnosis.* Pathologically this is a much wider field, including the lesions of a variety of organs. Full credit is due to the Minerbis for having attempted that investigation, but they were at a disadvantage in not being familiar with the normal field of percussion which has now been more clearly defined.

In major upward dilatation of the left auricle, in major pericardial

effusions, in aortic aneurysm or dilatation, in enlarged thymus, in upper mediastinal adenopathies and tumors, and particularly in tracheobronchial adenopathies, and in esophageal disease, we identify the element of variation as an abnormal "dulling" influence, counter-acting the "resonant" influence of the lung, so as to increase both the size and the intensity of the oval dulness, to destroy its symmetry, and sometimes to modify its shape.

The share taken by the aorta in the production of the normal oval dulness is manifest; while its dilatations and its aneurysms cannot fail to intensify the latter. This may invalidate the distinction drawn by Sir William Broadbent between the aneurysms of physical signs and the aneurysm of symptoms, thanks to a more searching percussion of the interspinous region. But the azygos arch, described by the Minerbis as yielding normally a small paravertebral area of dulness, has so far eluded identification within the oval interspinous area.

In conclusion: (1) The oval patch supplies a normal standard for upper dorsal percussion; (2) the method is a means of estimating the general respiratory activity of the lung and that of the apices; (3) it differentiates between functional overexpansion and emphysema, between functional underexpansion and phthisis, and between local atelectasis at the apex and the lesions of tubercle; (4) in addition to its pulmonary and pleural data it opens up a wide range for upper mediastinal diagnosis; (5) it is likely to contribute to an earlier diagnosis of incipient pulmonary tuberculosis by physical signs.

UNILATERAL BREATHING AS A METHOD OF DIAGNOSIS. "Functional inexpansion and atelectasis, or organic disease?" That is the delicate problem of our every-day early diagnosis. We clearly cannot rely upon ordinary bilateral breathing to decide a unilateral question: it may or it may not affect the disparity, it may increase or lessen it, remove it perhaps if it be but slight—a mere chance work at the best because not systematic and differential, more apt indeed to veil rather than reveal the condition. All experts are aware that the worst hindrance to a successful examination is to begin by a call for deep breaths; this ruins fine accuracy in observation, which depends upon excluding all conscious effort or anxiety of breathing. The chest-clip (elsewhere described), which I devised some four years ago for the therapeutic purposes of unilateral apex-rest and unilateral apex-exercise, though still awaiting its wider clinical test, has proved ever since an invaluable aid for differential diagnosis. Of horse-shoe or "paper-clip" shape, with suitable pads for application to the spine and to one or the other pectoral surface, it differentiates at once the "functional" from the "organic" apical lameness. It tests both apices in succession, and it does so most reliably, because the patient's attention is called away from his breathing to watching the procedure and the spring. The manipulation being so simple and its results so rapid, great saving

of time is obtained together with much information not otherwise obtainable. If flattening exists on the left side it may be partly or entirely removed under a few minutes' gentle mechanical check to the activity of the right, while meanwhile auscultation or any other examination is in progress. This simple device will approve itself on trial to any busy physician; yet like every clinical method, it will require some experience, as well as the needful skill and judgment. It is probably the most mechanical of our present aids to chest examination.

ALBUMIN IN THE SPUTUM, an easy bed-side test (by acetic precipitation and filtration, after shaking, of the mucin and nucleo-albumin, and identification of the albumin in the filtrate by boiling or potassium cyanide) has been found so conclusive by Kauffmann,¹ in a series of 108 cases of phthisis, that he ranks it with the reliable differential tests localizing tuberculosis to the lung, and indicating an active stage; and as a necessary diagnostic check upon the action of tuberculin, in the early stages. This is due to the fact that it is characteristic of pneumonia (disappearing with the crisis), as well as of pneumonic congestion and fetid bronchitis, as opposed to simple bronchitis. Its continuance after a pneumonic seizure is a danger signal. Under tuberculin it is often a finer test for a focal reaction than the physical signs, and may not appear until the dose has risen to activity. In many cases it is constantly positive, though no bacilli may be found. According to Geerard, its conjunction with a positive skin test identifies an active pulmonary process; with a negative skin test, a non-bacillary pulmonary affection; and its absence while the skin reacts, a latent tubercular condition. The value of the test is dependent, however, upon the exclusion of various other causes, and in particular of pulmonary edema of renal or cardiac origin.

RESPIRATORY MECHANISMS AND METHODS

The "Dead Space" in the Respiratory Passages. C. G. Douglas and J. S. Haldane² inaugurate a systematic study of far-reaching importance in physiology and clinical pathology, which had long been urged by Watson Williams, a staunch believer in arrhythmic participation of the bronchial musculature in the normal respiratory act, and in the etiological influence of its disturbances in some of our respiratory affections, and in particular in asthma. The subject is approached by them from the side of the variations, under varying physiological conditions, of the capacity of the tubular system which connects the alveoli with the outer air. The term "dead space" implies that this

¹ Beiträge, 1913, xxvi.

² Journal of Physiology, 1912.

has no active share in the respiratory exchanges; and they assume that its varying capacity is an expression of the contraction or dilatation of the tubes, and that it must be bound up with changes in the resistance to the air flow. They point out that the regulation of that resistance by the smaller bronchi should be regarded as of equal importance for the even distribution of air within the lungs, with that of the regulation of the circulatory resistance by the arterioles for the efficient distribution of blood throughout the body. Any failure in that regulation would entail a loss of efficiency of the respiratory function of the alveoli resulting in a faulty arterialization of the blood, and of their mechanical function, probably resulting in the production of emphysema. If the bronchi remained constant in diameter whatever the flow of air, the resistance would either be excessive during hyperpnea or insufficient during quiet breathing.

These considerations open up a wide view over the physiological and the pathological operations of the hitherto almost ignored motive function of our complex air-conducting system. Meanwhile the observations conducted upon C. G. Douglas himself, as a subject for experiment, were confined to a determination of the "total dead space" variations. These proved to be surprisingly great under such opposite conditions as those of walking at the rate of five miles an hour, and of complete rest in bed. Under that exertion the capacity increased in the proportion of 4 to 1; while, although the increase in the number of respirations was slight and not uniform, the volume of air breathed was increased about eight times by walking at five miles an hour, and the alveolar ventilation and discharge of CO_2 about twelve times their resting values. The enormous increase in the volume of air breathed was, therefore, almost entirely due to an increase in the depth of each inspiration. The depth was increased from 457 c.c. when resting in bed to 3145 c.c. when walking at five miles an hour; but the respirations were only increased from 16.8 to 19.5 a minute. Even so the breathing was far from being maximal.

In regard to the local or central reflexes by which the state of contraction or dilatation of the bronchi in various parts of the lung is regulated, our knowledge is still limited, although the authors admit the existence of bronchodilator as well as bronchoconstrictor nerve fibers as having been demonstrated by Brodie and Dixon. They leave it an open question whether, besides asthma in which the bronchi are unusually constricted, there may not exist opposite abnormal conditions, namely, those of a pathological degree of bronchial dilatation.

Kuhn's Mask is the most direct mechanical means we possess of influencing the circulation locally within the lung and the right side of the heart, although this can never be absolutely free from a joint effect upon the general circulation and the left heart. The normal respiratory play of the thorax is that of a pump. Its main office is

to move air in and out of the lungs; but part of it is also to promote the circulation through the pulmonary vessels of the blood which is supplied to them by the systole of the right ventricle, independently of any respiratory movement. The air supply is entirely dependent upon the latter; and upon its complete freedom of access to the alveoli. If the trachea were ligatured or plugged, it is obvious that each recurring inspiratory act would be wholly expended upon the blood supply; it would charge the lung with so much blood instead of air, by accelerating the systolic output from the right ventricle, and also its diastolic filling owing to a greatly increased aspiration of the venous blood pouring in from the vena cava, and therefore from the entire venous system. It is essential to bear in mind that general circulatory effect which immediately follows upon the interference primarily localized to the lung. While the lung tends to be overcharged with blood from the right side of the heart, it tends to be in some measure relieved of it by increased facilities in the systemic circulation. Nevertheless, if life could be maintained, the result would be a growing accumulation of the blood in the great veins, a distention of the right heart, and a progressive overfilling of the vessels of the lung.

In short, the major interference in question operates in two directions. Locally, it calls into play the passive reservoir-function of the lung and of the right heart. Its general effect is an active acceleration of the arterial circulation.

Granted these main mechanical principles, with all due reservations for the varied adaptive mechanisms which modify their action, we can form some idea of their operation when, instead of being suppressed, the supply of air is only partially restricted. This tells first upon the respiratory movement itself; it will endeavor by increased and sustained muscular effort to obtain at each inspiration the normal quantum of air by increased suctional negative pressure and increased rapidity of air inflow; and it will succeed in doing this if the restriction is not too great. The pulmonary expansion will occupy a longer time, but will not be diminished. The lungs still obtaining their normal complement of air, will not call for more blood as a substitute for it; their passive reservoir function will not be called into play. Although temporarily delayed at first, the normal amount of blood will be finally got through into the arterial system by the four systoles corresponding to each respiration. The main result of that unusual respiratory stimulus will have been not the permanent hyperemic reservoir result, but only the active circulatory benefit conferred upon the earlier systoles.

When, on the contrary, the obstruction is such that no increased inspiratory energy can supply that quantum of air, the chest will be unable to expand fully, and, under the strong negative pressure of effort, blood will be drawn and kept within the lung in proportion to the diminished

expansion. The main result will be the passive reservoir effect, while the active benefit to the circulation will occupy a secondary position.

Therapeutically, the question is which of these two lines of action is going to be of service in any given case. If the reservoir function is ever to be called to aid, how much of it is likely to be safe and beneficial? We may assume that the minor check to the air supply, which acts essentially as a respiratory and as a circulatory stimulus, will be suitable to a variety of morbid conditions; and that any more severe check will be of limited application. The practical advantage of Kuhn's mask is that it enables us to graduate the obstruction and to control the effect.

But we have said enough to show that a considerable amount of speculation must still prevail as to the physiological mechanism of the method and as to the precise mechanism of any advantage which may be gained from its employment. The matter is manifestly much more complex in theory than is suggested by its designation as a method for setting up passive pulmonary hyperemia, and will need to be submitted to searching analysis in the future.

Clinically, we are at liberty to form a practical estimate of its value from the tangible results; and we now pass from the theoretical aspect to a consideration of those presented to us in an important paper by S. Brotzen,¹ based upon his own large experience at the Beelitz Sanatorium near Berlin, and to that of other observers. His main conclusion, derived from the systematic use of the method in 118 patients, is eminently favorable; and he speaks with unreserved approval of its varied benefits, attested even by those who felt at first somewhat diffident of trying it. Compared with the continuous inhalation method, the infliction is not severe. The mask is worn for limited periods of one-quarter of an hour to one hour, three times daily, in the recumbent position. It is not cumbersome, and is made to fit air-tight over the mouth and nose. Its essential features is the possession of valves through which all the air has to pass to and from the lungs. The expired air meets with no obstruction; but the inspiratory air supply can be more or less reduced by careful regulation of the valve, with corresponding alterations in the breathing. The resulting increase in the inspiratory negative pressure brings the inspiratory muscles into stronger action, prolongs the inspiratory period, diminishes the respiratory rate, and presumably draws more blood into the lungs. The beneficial nature of these influences is soon apparent in the patient's condition. Decided improvement was noted in connection with undue frequency of breathing, cough, anorexia, and deficiency in hemoglobin. Special mention is also made of a remarkable influence in promoting sleep, which suggests that the mask might be found of value in some forms of insomnia, of neurasthenic type. These general

¹ Beiträge z. kl. d. Tub., 1913, xxv, No. 3.

results would seem to recommend the mask as a valuable addition to our respiratory therapeutical methods in a wide range of cases where a lowered vitality has to be raised. In that direction it might be borne in mind as a possible prophylactic against the threatenings of tuberculosis. It is stated that in asthma some patients have been able, by resorting to it, to check the onset or the progress of their attacks.

The curative effects are most perceptible, according to Brotzen, in acute and chronic bronchitis, in chronic pneumonia, and in pleurisy. He has also been impressed with its beneficial results observed in slight or mild pulmonary tuberculosis, in asthma, in emphysema, and in chlorosis. He gives a detailed account of 30 of his cases; and a special feature of the paper is a spontaneous report from 8 of his patients of the benefit they had derived, and of their enthusiastic appreciation of the treatment in spite of any previous prejudice on their part.

T. W. Williams,¹ of Milwaukee, has found a simple substitute for Kuhn's aspiration mask in a short length of a small catheter, about No. 16 F. or a straw or quill to draw the breath through, thus retarding inhalation quite as effectually. The only benefit of the mask is to insure a deep, full inspiration of air slowly and gradually, holding it a few seconds, and then its sudden expiration. "When the heart is weakened and tired, and there is pain from overdistention of the right chamber, if the patient will lie down for five minutes and breathe in that manner through a quill toothpick or even through his teeth, the relief experienced will be immediate and most remarkable. I have often practised it myself for nervous excitement and insomnia, usually falling asleep before five minutes. I have for many years instructed anemic and nervous patients to practise the method for five or ten minutes on first lying down at night, without explaining the reason further than to say that it would expand the chest. It may also be practised when sitting at a desk or reclining in an easy chair, and it really does oxygenate the blood and improve the breathing capacity."

This is the converse of an almost equally simple use of the toothpick (with a tube attached), namely for the purpose of blowing bubbles through the "respiratory water-bottle," constructed and long used by me for improving the "expiratory" function, and thus obtaining a fuller inspiration for purposes of activity. The results cannot be identical. This suggests a few remarks in connection with the respiratory factor in insomnia, so strikingly demonstrated, by contrast, in the hibernating animal. For sleep the lung has to be considerably reefed in for cerebral reasons. The "instantaneous sleeper" whether animal or man, starts off with two or three deep, sighing expirations which at once bring down the thorax to its "sleeping" capacity. The sleepless

¹ Journal of American Medical Association, vol. xl, p. 757.

unwittingly keep up their full respiratory charge; and "counting aloud a hundred" may well help them. If this be true it would argue that the other method tends to empty the chest by checking the inspiratory expansion and allowing free way through the nostrils for the deepest expiration, a plausible remedy for wakefulness.

Respiration in the Orthopedic Treatment of Scoliosis and of Rachitis. The importance of breathing exercises, not only for the sake of their tonic effect but as a mechanical means of influencing the spine, receives some attention from René Mesnard,¹ who recognizes that any adenoid, pleural, or pulmonary obstructions tend to deform the spine and chest, while any scoliotic deformity tends to hamper the respiration. Similarly he finds that, whereas respiration is generally diminished and rendered asymmetrical by scoliosis, breathing exercises (of costal type) aimed at correcting the asymmetry are of great help in strengthening the spine and the chest. He quotes Caminade's book (1897) on "Thoracic Development by Respiratory Gymnastics" as stating that: "It is the asymmetrical side which benefits first and most rapidly until it has become level with the sound side; after which both continued to develop evenly." No mention is made by Mesnard of the clinical employment of "unilateral" breathing.

In Rachitis, in addition to striking results from abdominal massage, and cutaneous stimulation and massage, F. Kirchberg,² the head of the Berlin massage institute, mentions the remarkable beneficial effect in scoliosis of systematic deep breathing during gymnastic drill, of special breathing exercises, and of a procedure which, though that name is not specified, practically amounts to "unilateral" breathing. The child is laid prone on a firm couch, and while it is made to breathe deeply, with a long pause after each inspiration, the masseuse keeps up a firm pressure upon the pelvis and upon one of the shoulders. By alternating the side of the shoulder pressure both chests can be exercised—and powerful effect is taken upon the spine by the rise of and backward movement of the ribs.

I do not find any reference to unilateral breathing in Tubby's classical work.

Spinal Culture. A fundamental indication at all ages, its significance, is hardly yet recognized at its full value in chest affections. The evil consequences of scoliosis especially affecting the thoracic functions, and in particular pulmonary expansion, are those which most concern us here, although some of the abdominal evils are almost worse. Might not much of all this be prevented by greater forethought in infantile and puerile hygiene? The robust may be safely trusted to the care of nature, but in the presence of a familial predisposition, or of the denutritive effects of latent tuberculosis, rachitis, and infective disorders the risk of spinal weakness is great, easily foreseen, and

¹ Archives Générales, June, 1912.

² Med. Klinik, September 10, 1911.

probably amenable to preventive therapy. F. Goppert¹ insists upon that early opportunity, too often neglected. His method, also applicable to cases of early gastro-intestinal disorders, consists in turning the child for a short interval of time on its stomach. In that prone position the disused spinal muscles are easily exercised by tickling the nape of the neck, whereby the spine is extended and the head raised. The same indication is carried out in a more systematic way in the method which I devised some years ago for the treatment of rickets. After the acute stage, which may be quickly benefited by castor oil and judicious elastic belting for the abdomen, in addition to suitable diet and medication, it would be equally irrational to permanently confine the convalescent to rest in bed, or to throw upon his weakened spine and limbs the weight of the head and body as in sitting, standing, or walking. Exercise is needed for the muscles, which shall be free from any load. The "prone infants' exerciser," practically a padded trough on wheels, upon which the child is secured by a broad belting, allows full scope for arm and leg movements, keeps the spine straight and level, and relieved of the weight of the head, except when this is raised in the effort to move the carriage by paddling with the feet. The same principle is carried out on a larger scale in the adaptable and variously convertible "convalescent machine" devised for adolescents and for adults.

BRONCHIAL AFFECTIONS AND THEIR TREATMENT

The Diagnosis of Tracheobronchial Adenopathy in Children is exhaustively discussed by J. M. Gesteira.² The more general signs are those perceptible on inspection; unilateral unevenness in pulmonary expansion with labored breathing; and local interference with the freedom of the venous circulation, productive of characteristic engorged branching veins. Palpation reveals wavy inspiratory delay on the side most affected. Light percussion—this is the only form suitable to the hyperresonant puerile thorax—is best performed with the head retracted for anterior examinations, and inclined forward for dorsal work. The glandular dulness has its chief site at the sternoclavicular articulation, in contrast with any apical dulness which is localized further outward along the clavicle; the thymus, on the other hand, gives an upper manubrial dulness, and its triangular shape is distinctive. The auscultatory signs are usually those of bronchial loudness and prolonged expiration in the same situation, associated with relative impairment of the vesicular murmur. A venous murmur above the manubrium when the head is retracted has been described,

¹ Therap. Monat., February 2, 1913.

² Brazil Medico, January 7 and 15, 1913.

but has not occurred in his own experience. The *dorsal signs* are important. Percussion should be able to reveal any considerable enlargement by dulness at the infratracheal level, where the chief glands affected are to be found. As regards dorsal auscultation, Rilliet has laid much stress upon the pressure of a rhonchus audible at the bifurcation; this Gesteira has failed to identify in his cases. But he lays considerable reliance on d'Espine's sign, which consists in determining how far the whispered voice is propagated along the vertebral spines. Normally its intensity diminishes downward from the seventh cervical spinous process; but in tracheobronchial adenopathy it is distinctly heard as far as the fourth dorsal. He considers this to be perhaps the most characteristic, and one of the earliest guides to a correct diagnosis, as healthy subjects are not known to present it.

Asphyxia from Intrapulmonary Inhalation of Mothers' Milk may perhaps have been answerable for some of the infantile deaths which have hitherto remained unexplained. In J. Hjorst's¹ remarkable case, postmortem evidence was obtained of the presence of milk in the aërial passages, and this was consistent with the clinical report. The infant is stated to have been perfectly healthy. Increasing cyanosis and dyspnea were observed for two hours after suckling. Artificial respiration and stimulants afforded some relief to both; but during the night's sleep the breathing became worse and death followed in the course of a few hours. A knowledge of the possibility of this rare occurrence is of importance as a guide to treatment in similar clinical circumstances; this should presumably be carried out on the same lines as the resuscitation of the apparently dead in other forms of drowning.

The "Bronchoscope-spray" Treatment of Asthma and Bronchitis. The latest development of the direct, local, endobronchial treatment of these affections, which we owe to C. Heilsko and L. Mahler,² and is well described in the *Epitome of the British Medical Journal* (1913, p. 49), as carried out in 27 cases of asthma and 3 of bronchitis, consists in the administration, through the bronchoscope, by means of a Brüning's pulverizer, of a spray of the following composition: Novocain, 10 cg.; 1 per cent. solution of adrenalin, 1 gram; and 0.9 per cent. sodium chloride solution, 9 grams.

This was achieved in some 120 insufflations, in a selection of refractory cases without any alarming symptoms (13 men, 16 women, and 1 child), 5 of which only were ambulatory. The preliminaries include a subcutaneous injection of morphine (0.5 to 1 cg.) half an hour in advance, and painting the pharynx and larynx with a 10 per cent.

¹ Norsk Magazin f. Laeg., February 2, 1913.

² Ugesk. f. Læger, December 12, 1912.

cocaine-adrenalin solution prior to the introduction of the bronchoscope spray. This is gradually pushed as far as the bifurcation, with intervals of rest for coughing up the secretion when this is profuse. In one instance the treatment was repeated as often as ten times. The results were: For bronchitis, in one "a successful" application; in another, "improvement"; in a third, "no change." For asthma: 5 were subsequently free from attacks, the period of observation being over one year; in 10 cases there was improvement; in 12 temporary relief, in 1 of these recovery was apparently effected after the fourth insufflation, but eight days later the attacks recurred and were refractory to further treatment. All experienced relief to respiration with deeper breathing for some hours after an insufflation. The expectoration became temporarily profuse in several cases. As to the explanation of the benefit derived, Nowotny thinks that cocaine and adrenalin reduce the hyperemia and swelling of the bronchi, and that the bronchoscope acts mechanically as an expectorant; Ephraim, that for the bronchial spasm the bronchoscope may do what a sound down the esophagus does in permanently curing esophageal spasm; he considers, however, that the anesthesia and anemia are the more important factors. The authors believe that their good results depend on both factors; for in 3 cases they introduced the bronchoscope without any spray and the subsequent improvement was as great as when the drugs were used. The converse of this purely mechanical effect is supplied in the other older form of endobronchial treatment, namely, by *translaryngeal injections*, without any mechanical interference with the trachea; this has long been advocated and practised by Colin Campbell, of Southport. Both methods are heroic. It is much to know that they may be safely applied. But *qua* heroic they cannot be neutral; and can hardly fail, if further tested, to give a clearer account of themselves.

Vaccine Therapy in Chronic Bronchitis. H. T. Gillett,¹ who has also treated acute cases, gives his results in the first 8 of his chronic cases in the order of their occurrence. They compare very favorably with those of Latham's 5 cases, of H. R. Smith's 3 cases, and of Shivdas' 21 completely successful cases out of an aggregate of 39 treated. They confirm the probability, based upon reliable evidence, that a large proportion of cases of bronchitis are caused by an invasion of the bronchial mucosa by pathogenic organisms. Ritchie made a number of postmortem examinations of children who died of acute bronchitis, and showed that the bronchitis was caused by microorganisms, chiefly the *Diplococcus pneumoniae*, *Streptococcus*, *B. influenzae*, and *M. catarrhalis*. Berkart believes that some forms of bronchial asthma are due to a specific inflammatory condition of the bronchial mucous

¹ British Medical Journal, February 22, 1913.

membrane caused by microbic influences. In two of Gillett's cases, there was a relapse with the return of wintry weather, necessitating a fresh course. In the others the recovery was permanent. He used only autogenous vaccines with one exception. Stock vaccines may be sometimes effective, but a stock vaccine of similar morphology to the causal organism does not necessarily correspond to it in every respect.

The injections were given without opsonic control. The dosage was judged by the effect produced by the first and subsequent injections on the general symptoms, as well as by the amount of local reaction at the site of the injection. The first injection in each case was well within the recognized dosage. If there followed very little or no negative phase the next dose was often doubled. If the negative phase was marked, the same dose (or a smaller one) was given in about ten days time. But usually he was able to increase each dose by about one-third to one-half of the former one, and his aim was to try and obtain a reaction during the following twenty-four hours.

His conclusions include the following rules: "(1) Make sure what microörganism is the cause of the trouble and whether others are associated with it. (2) Use an autogenous vaccine in preference to an heterogenous. (3) Make it up from *fresh* sputum; try different media for its preparation; grow the microörganism for not more than twenty-four hours if you can get sufficient growth in that time; avoid subculturing as far as possible; sterilize by heating to 60° C. for a quarter of an hour instead of one hour, or in some cases merely by the addition of 0.5 per cent. carbolic. (4) Give doses large enough to produce a reaction, but avoid a prolonged negative phase.

Though vaccine therapy may be said to be still in its infancy, yet it has already achieved a great deal, both in the prevention and cure of various bacterial diseases. And now that serum therapy can be combined with vaccine therapy by giving sensitized vaccines, it seems probable that in the future it may accomplish still more, especially in acute cases such as pneumonia and septicemia, and will eventually largely replace the treatment by drugs in those diseases which are caused by microörganisms."

Voice Production is largely a respiratory question. This is perhaps most clearly demonstrated by the familiar failure in elementary respiratory technique which too often culminates in the "clergyman's sore throat." That evil is likely to be successfully met by the practical step recently initiated at Oxford by the Regius Professor of Divinity, Dr. Scott Holland, Sir William Osler, and Mr. Ernest Waggett, at a conference held at Christ Church for the purpose of founding a school of voice production. May we hope that the example set by the old university will be largely followed for the benefit of the clergy and of their congregations.

Chronic Pneumococcal Infection of the Lungs in Children is discussed in a series of cases by P. L. Sutherland and A. A. Jubb.¹ They feel justified in drawing the following conclusions: (1) Phthisis is not so common in children as certain recent reports would appear to imply. (2) Many cases of phthisis or "suspected phthisis" in children are really chronic pneumococcal infections of the lungs inducing bronchial and peribronchial lesions. (3) These pneumococcal cases in children form a large percentage of the cases cured or improved in open-air schools. (4) It is extremely likely that such cases in children are treated at tuberculin dispensaries as phthisis in which the tubercle bacilli are not found in the sputum. (5) These pneumococcal infections tend to be chronic and non-fatal, though there is always the liability to tuberculosis infection.

Chronic Amebic Bronchohepatic Suppuration Cured by Emetine. This remarkable case was read before the Académie by Professor Chauffard,² on February 25, 1913. The symptoms had lasted for five months and were cured in five days by Professor Leonard Rogers' method of hypodermic injection. "The patient suffered from irregular fever, and was expectorating daily on an average nearly a pint of the characteristic crushed strawberry material. On the second day of the treatment the temperature fell to normal and the amount of expectoration was much reduced. On the fifth day it ceased, the leukocytosis had greatly diminished, and the patient began rapidly to gain weight. The physical signs in the thorax disappeared, and ulceration of the rectum, which had been seen before the treatment was begun, rapidly healed. The drug produced no unpleasant effects, and by the second day the patient declared himself distinctly better." Chauffard also cited two cases recorded by Rogers in which, after death from accident not long after the treatment had been concluded, intestinal ulceration was found completely cicatrized, and which afforded complete evidence of the efficacy of the traditional empirical treatment of dysentery by ipecacuanha. The rapidity of the cure can only be explained on the assumption that the emetine directly attacked and killed the intra-hepatic ameba, thus realizing the ideal of *therapia sterilans*, with a success comparable to that of "the most specific tropisms known, such as the action of quinine in malaria or of salvarsan or mercury in syphilis." He also pointed out that as the two chief types of dysentery differ in their pathogeny, so their duality is shown also in the field of therapeutics, both being curable by a different specific treatment, the bacillary dysenteries by serotherapy, the amebic by emetine.

We quote³ further evidence of the efficacy of Rogers' method. "Flandin and Dumas have reported to the Société Méd. des Hôpitaux an equally successful case. The patient was a woman who began to

¹ British Medical Journal, May 31, 1913.

² Ibid., vol. i, p. 574

³ Ibid., p. 634.

suffer from what was taken to be phthisis in December, 1910; a diagnosis of amebic abscess of the liver, opening into the lung, was made in July, 1912. In December, 1912, the emetine treatment was begun, and in an extremely short time the purulent discharge ceased and the patient was completely cured. Dopter mentioned a case which he had treated under very similar conditions with equally satisfactory results. Chauffard has since communicated to the same society another serious case of abscess of the liver which recovered very rapidly. It was operated upon, and the patient was also given emetine. We may therefore conclude that, apart from its immense life-saving scope in the abdominal developments of dysentery, a not infrequent and usually fatal form of intrabronchial suppuration has now been added to our growing list of curable affections. What emetine may be destined to do for us in the control of non-parasitic autochthonous amebiform life and disease is the secret of the future. For so much as has already been achieved, we are heartened in our belief in the life-saving treasures of our vegetal kingdom.

CARDIOLOGY AND CARDIOVASCULAR SYSTEM

Cardiological Progress shows unprecedented activity along the promising lines of the electrocardiograph and of the polygraph. It is inevitable that those technical studies should not have yet matured into great applications to practice. This somewhat lessens our great regret that the reports already written on a series of many important papers, by Mackenzie, Waller, Walter Lewis, Price, Halls Dally, Tasker Howard, and others should remain in manuscript for want of space in these pages. May we soon be garnering the practical harvest from so much patient research.

"Hyposphyxia" as a Clinical Syndrome. Alfred Martinet¹ describes under that name a permanent state of circulatory weakness, evidenced by low systolic pressure, venous plethora, congestions and cyanosis, cold extremities, and many other allied symptoms, which is found not exclusively in heart sufferers with mitral or bicuspid stenosis, but in many other conditions including emphysema, chronic bronchitis and tuberculosis, sometimes kyphosis, and also in a large number of individuals free from organic disease though probably predisposed by a congenitally hypotropic heart to the depressing effects of bad hygiene and of a sedentary life. Martinet claims for this syndrome a more definite recognition than has hitherto been awarded to it in our textbooks. "Hyposphyxia" may be a convenient addition to our terminological formulas; it does not seem to qualify for any definite nosological status.

¹ Presse Médicale, December 21, 1912.

The Nature of Surgical Shock has been submitted to a renewed experimental investigation by W. Webster,¹ who reports the results which he has obtained in dogs, and their bearing upon the views which have been published by recent observers. His conclusions are as follows: (1) Under certain circumstances, a condition of depressed vitality occurs in dogs under operation, usually after a prolonged experiment under anesthesia, especially when the intestines are exposed and frequently handled. This depressed vitality is manifested by a lowering of the blood pressure and sometimes by an interference with the respiration. (2) Compression of a large bulk of intestine raises the general blood pressure, although brisk handling of the gut causes a temporary lowering. These are transitory effects and not clearly connected with "shock." (3) As to whether increased escape of carbon dioxide from warmed and moistened intestine is an important feature in the production of shock, the results of the experiments are inconclusive; but the slowly progressive depression of vitality cannot be prevented by treatment of the warm saline with carbon dioxide. (4) In but few cases did stimulation of afferent nerves produce a lowering of the blood pressure, in none a condition resembling shock. (5) If anesthesia is not very deep, the abdominal incision may cause a lowering of blood pressure, which may be considerable and prolonged if the incision also is of this character. (6) A condition of shock develops after prolonged operative procedures when the intestines are exposed to air or moist warmth, or occasionally after very severe operative procedures which are of comparatively short duration, but which interfere to some extent with respiration.

The Jugular Pulse and the Beginning of Diastole. To justify his statement to the effect that the starting place of the diastole is at the fundus of the X depression in the jugular tracing, H. Walter Verdon² appeals to the time table of the intraventricular pressures rather than to the instant of semilunar closure. Since that closure results from an initial fall in intraventricular pressure, diastole must begin earlier, namely, according to Hürthle, $\frac{1}{30}$ second before, and this would localize it in the situation stated. In regard to the C wave, he reminds us that it is not a "direct" arterial impression, but one conveyed by the moving venous column. For that reason the deflection representing C rises and falls with the venous column during respiratory movements, instead of remaining upon a stationary plane.

"Interrupted Circulation" as an Arteriosclerotic Test. That term is used by C. Hertzell³ in its plain meaning ("local stoppage of blood flow"). I was wrong in selecting it for a method the essence of which is temporary *absolute anemia*, more strictly, local *exemia*. He states that in the normal subject when all the limbs except the manometric

¹ Canadian Medical Association Journal, February, 1913.

² Lancet 1913, i, p. 239.

³ Berl. klin. Woch., March 24, 1913.

arm are pneumatically compressed in the recumbent posture, the "congestive pressure reaction" amounts to a rise of 5 mm. Hg. In arteriosclerosis this reads 60 mm. or more, owing to the loss of compensatory dilatability in the arterial districts of the trunk. He bases upon this observation a warning against hydropathic therapeutics whenever the test gives unfavorable readings. The method is instructive; but the test itself is not quite independent of practical "caution."

The Early Recognition of the Pulsus Alternans at the Wrist is of value as direct evidence as to the contractile power of the myocardium, irrespective of any changes in its irritability and conductivity. L. Gallavardin and L. Gravier¹ suggest some improvements in our methods of observation. In the high pulse pressures of some cases of nephritis they find that careful palpation may detect this form of arrhythmia; but it may sometimes be recognizable only by partly checking the strength of the pulsation, either by the manual or by the cuff method. If the brachial artery be gradually compressed against the humerus, the pulse at the wrist may be sometimes converted into the alternating type for a succession of beats. The same result may be obtained with greater precision by the instrumental method, and the alteration may be demonstrated by the sphygmograph, or by the dial of the sphygmanometer. In effect a potential pulsus alternans is revealed as an actual one by this facultative suppression of the weaker beats.

Arteriosclerosis of Infective Origin. The most important contribution hitherto made to our knowledge of this mode of derivation is the extensive investigation conducted in Metchnikoff's laboratory by Y. Manouélian.² It confirms on a large scale the few positive results which had been recorded after experimental inoculations with the staphylococcus, with the typhoid bacillus, and with an organism obtained from ulcerative endocarditis. Various strains of staphylococcus were inoculated in a long series of rabbits, with positive results in 84 per cent., whereas the normal incidence of aortic changes in the adult rabbit has been estimated at from 4 to 19 per cent. only; and also in a few monkeys, 5 out of 6 giving a positive result. The stronger strains of coccus proving too rapidly fatal, the most illustrative pathological productions were obtained from repeated injections of the weaker ones. In most instances, the familiar superficial patches were limited to the arch and its vicinity. In a few cases the changes were advanced, threatening aneurysm; and calcareous or cartilaginous deposits were found. The leading feature was a degeneration of the elastic tissue and of the muscular fibers, the elastic tissue alone supplying the calcareous deposits. In patches of considerable duration, the elastic tissue had completely disappeared. The thickening which was not always present in the aortic wall itself, was mainly

¹ Lyon Médical, December 29, 1912.

² Annales de l'Institut Pasteur, January, 1913.

within the middle coat. The microscope did not furnish any absolute demonstration of an immediate nexus between the staphylococcus and the arteriosclerosis. We might have been told more concerning the clinical conditions observed in the cases with protracted course. But the high percentage of the occurrence of lesions leaves little doubt as to the genuineness of their infective origin, and suggests as highly probable that the same etiology may be applicable to the human affection.

The Significance of Overtension as a Symptom for Treatment. Good work is being done by thoughtful clinicians such as James Third, Henry F. Stoll, David Riesman, A. Strubell, and others, whose endeavor is to restrain our manometric *nimia diligentia*. Riesman¹ insists upon the necessity for normal standards in clinical blood pressure, as a vital function, in contrast with the "anatomical" weighings of arteriosclerotic changes. Stoll² traces in 90 per cent. of "overtensives" either bad kidneys or arteries. Their pressure coefficient is "essential." The "incidental" coefficient of pressure alone can be handled. J. Third³ studies the "cardiovasorenal" breakdown of arteriosclerosis which is preventable in early time, in women aged from forty-five to sixty years, in business men aged from forty-five to sixty-five years, and in doctors aged from fifty to sixty years. Vasodilators are a snare; and too many restrictions self-condemned. It will not do, even *propter vitam*, to lose all our *vivendi causas*.

The Cardiac Sign in Cancer. William Gordon's⁴ further experience is summed up as follows: (1) The sign is of practical value. (2) If present in a case where the presence of cancer is possible, the diagnosis of cancer should only be rejected after most careful consideration. (3) If absent in what may be an early case of cancer, little stress must be laid on its absence. (4) But if absent in what may be, if cancer at all, a late case of it, its absence strengthens considerably the likelihood of the absence of the disease.

Cardiolysis and its Indications are fully discussed, with an illustrative case, by Simon.⁵ He dwells upon the pressure upon the inferior vena cava at its orifice, which may have been set up by adhesions; and upon the desirability of finding some means to relieve it at the time of the operation.

Carbonated Baths. The indications and contraindication of Beneke's original treatment for heart affections by Nauheim baths are briefly sketched by I. M. Grödel.⁶ In regard to arteriosclerosis, the diffidence respecting high blood pressure has gradually been allayed; by a special

¹ American Journal of Medical Sciences, April, 1913.

² Medical Record, May 3, 1913.

³ Canadian Medical Association Journal, April.

⁴ British Medical Journal, May 31, 1913.

⁵ Ibid., December 14, 1912.

⁶ New York Medical Journal, 1913, p. 550.

preparation of the bath any undue rise may be avoided; nay, the pressure can be lowered temporarily. This contingent includes, as a fact, about 50 per cent. of the patients at Nauheim. In general, with suitable modifications, the bath treatment is available for almost every form of cardiovascular disturbance; but each group has exceptions, such, for instance, as failure of reserve power.

The special contra-indications under the separate headings are: (1) Valvular defects: Chronic dropsy from hepatic or renal degeneration, and chronic or recurring emboli in any situation. (2) In heart muscle affections: Any progressive symptoms of fatty degeneration; any gumma, newgrowth, infarct, or aneurysm of the heart. (3) In nervous heart disturbances: Generally very beneficial in vasomotor neuroses, also in nervous exhaustion, baths have no success in neurasthenics prone to excitation, together with heart trouble. (4) In pericarditis: Apart from mere adhesions or frictions, any hydropic inflammatory exudates. (5) In arteriosclerosis: Any permanent high pressure in excess of 220 mm., as probably of renal origin; vertigo implies special caution; apoplexy without any relapse disqualifies for at least one year. (6) In aneurysm: Whether diffuse or small, an obviously steady progression is the main contraindication. (7) In angina of all sorts: There is no exception to the benefit from Grödel's "graduated method," excluding only the "permanent" anginous aching or pain, and the *status anginosus* proper with or without acute pulmonary edema. (8) In chronic nephritis: If parenchymatous, no baths; if interstitial, they are beneficial except in the zone of the terminal symptoms. (9) In hepatic cirrhosis: The same remark also applies. (10) In respiratory diseases: Tuberculosis, no matter whether active or arrested, is always unsuitable; chronic bronchitis or emphysema are only sometimes prohibitive. (11) In chronic diseases in general: Any acute exacerbations contraindicate; and likewise pregnancy when it occurs in the presence of any cardiovascular affections.

Vein-to-Vein Transfusion. A. L. Soresi¹ lays down some principles and practical rules for the performance of direct transfusion for which he has devised a special technique. Surgeons should acquire the needful preliminary experience on animals, for successful interference in the urgencies arising during surgical operations or from hemorrhages. With regard to the latter, there is an essential distinction between those capable of being completely controlled and those due to hemorrhagic diseases. While in the former the first indication is to supply saline solution immediately, before, or during the transfusion, in the latter, transfusion should be practised first, as the blood will not bear any dilution before the hemostatic advantage conveyed by the transfused blood has been secured. In severe blood intoxications, transfusion will

¹ New York Medical Journal, November 9, 1912.

give the best results when a sufficient quantity of blood is abstracted during or prior to its performance. Soresi considers that, with special exceptions where the indication might be to obtain the blood from the radial artery, the vein-to-vein method is the correct as well as the easier one; and that, whenever it is possible, the recipient's external jugular should be selected, and its proximal part anastomosed with the distal part of the vein which is the transfusion chosen in the donor.

Sugar in Heart Disease may be regarded as a mainly nutritional remedy. Whenever it is not a surfeit, but a need owing to assimilative failure of other food, it loses its objections and acquires great alimentary value, thanks to its crystalloid fitness for direct absorption. For this reason it is well known as a "staff of life" for age; and the same applies to the digestive risks and disablements of cardiac failure. These considerations are well illustrated¹ in the recovery of S. E. Denyer's patient, aged seventy-seven years, of irregular pulse for years.

The Breaking of Vicious Circles. In his latest contribution to a subject which he has made his own, J. B. Hurry² applies himself to the therapeutical aspect. The first step is to seek the seat of least resistance. The method will vary with each case; but a few illustrations may be grouped under the following methods of breaking the circle: (I) By hygienic measures; (II) by surgical appliances; (III) by drugs; and (IV) by operation.

I. THE BREAKING OF THE CIRCLE BY HYGIENIC MEASURES, *Rest.* An illustration is presented by many cases of cardiac failure, where dilation of the overworked myocardium is associated with visceral disorder. By keeping the patient so quiet as "not to take one beat out of the heart more than can possibly be avoided," immense relief is given to the failing myocardium. More blood is then sent to the lungs and viscera, and returns to the heart as a more nutrient supply.

Exercise. Under other circumstances the opposite measures, namely, increased exercise, is called for, as in the circle of obesity. If the physician insists on some more active mode of life, the morbid correlations may be interrupted and health restored.

Cleanliness. Want of cleanliness may give rise to various circles, as, for example, to seborrhea genitalium, which provokes further secretion and putrefaction. Due sanitation will rapidly check the morbid reactions.

Prevention of Infection. As seen in the success of preventive measures where thread-worms are present. When a case is left to Nature, the irritation secures by auto-infection the continuance of the race, and patients may keep up their stock for many years. But with due

¹ Lancet, April 19, 1913.

² British Medical Journal, 1913, vol. i, p. 274.

precautions against reinfection, the worms disappear rapidly and permanently in from four to six weeks.

Nose-breathing. In weakly children nasal secretions may accumulate and block the nostrils until the child resorts to mouth-breathing. This in its turn favors the retention of nasal secretions and consequent nasal obstruction. By proper handkerchief drill, the nasal passages can be kept clear and the circle broken.

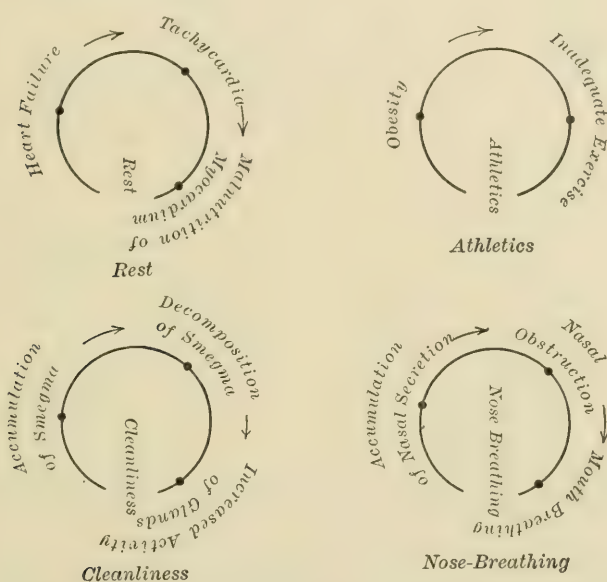


FIG. 14.—The breaking of the circle by hygienic measures.

II. THE BREAKING OF THE CIRCLE BY SURGICAL APPLIANCES.

Elastic Bandage. Varicose veins are frequently complicated by a circle, since the dilatation leads to increased tension on the vein-walls, and the increased tension aggravates the dilatation. The use of an elastic bandage supports the weakened walls of the veins, prevents their further dilatation, and breaks the circle.

Catheter. Prostatic retention of urine is often due to reciprocal correlations. The enlarged venous plexuses surrounding the prostate in elderly men readily become congested, causing obstruction to the urine which accumulates in the bladder. The pressure of the urine in its turn aggravates the venous engorgement, and so the process is perpetuated. Catheterization, by evacuating the bladder, relieves the pressure on the venous plexuses and cures the retention.

Pessary. Uterine congestion and prolapse are other conditions which aid and abet one another, and so give rise to a circle. A well-adjusted pessary prevents the prolapse, and, by relieving the congestion, breaks the circle.

Concave Lens. A fourth illustration is presented by progressive myopia, in which the myopia and the elongation of the eyeball react on one another. The prescription of concave lenses removes the near point, relieves the undue pressure on the globe, and checks the progress of the myopia.

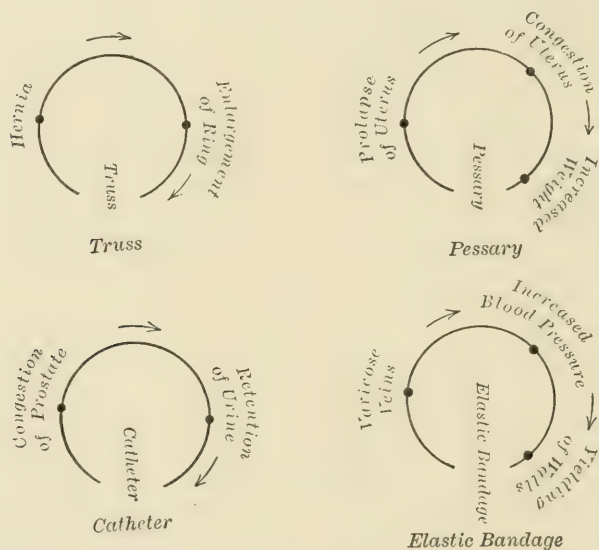


FIG. 15 —The breaking of the circle by a surgical appliance

III. THE BREAKING OF THE CIRCLE BY DRUGS. *Amyl Nitrite.* Hemoptysis may be complicated by what Francis Hare calls "one of the most highly vicious circles in pathology"—the hemorrhage, the cough, the mental perturbation, and the rise of blood pressure being factors that act and react on one another. One practitioner considers that he can best break the circle by using amyl nitrite to lower the blood pressure. A second prefers to lull the cough by means of morphine. A third pins his faith to the styptic action of ergot. In each case what appeared the seat of least resistance is attacked.

Digitalis. Many cases of failing heart are complicated by tachycardia. The enfeebled myocardium beats so rapidly that the ventricles can neither fill nor empty themselves as they should. The result is progressive weakening of the myocardium; and a dangerous circle is set up, which can be broken by digitalis.

Sedatives. Exaggerated reflex excitability due to prolonged irritation and weakness often lead to a state of unrest which intensifies the condition. The respiratory centre may be exhausted by constant irritation of cough; or the gastric centre overtaxed by severe stimulation from stomach, kidney, or uterus; although useless, the vomiting continues incessantly. Rest is urgently indicated for all cases of this

kind; often it has to be secured by morphine, which breaks the circle of unrest and irritability. A beginning once made, rest begets rest.

Other circles are closely associated with the presence of pain or insomnia. The reciprocal correlations can here be attacked by a suitable sedative, which by the removal of pain will break the circle.

Emetics. Dilatation of the stomach increases the stasis; and the stasis the dilatation. Timely use of an emetic may rapidly and completely relieve the condition. Even a greatly dilated and overloaded stomach may be braced up; its unburdening is followed by contraction and renewed functional activity.

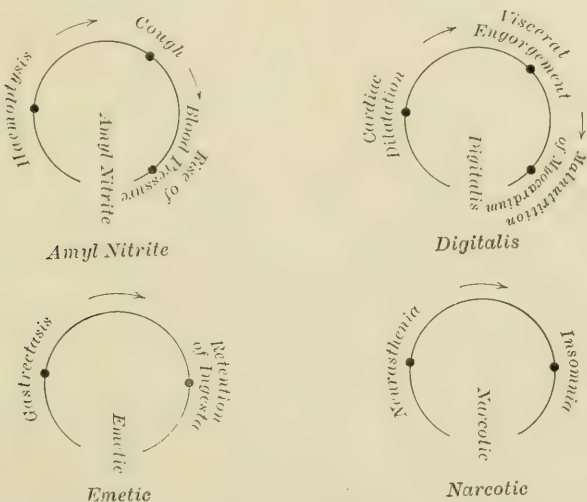


FIG. 16.—The breaking of the circle by drugs.

IV. THE BREAKING OF THE CIRCLE BY OPERATION. Surgery achieves some of her greatest triumphs by attacking the seat of least resistance.

Cholecystotomy. Here the surgeon can remove the calculus that is perpetuating the morbid condition. The pathological sequences being interrupted, the mucosa returns to a more or less quiescent condition.

Thyroidectomy. An enlarged thyroid compresses the trachea; Nature, in response, calls the supplementary respiratory muscles into action. But, unluckily, their contraction tightens the grip of the thyroid upon the trachea and the increasing dyspnea may end in self-strangulation. Prompt relief can be given by thyroidectomy, which relieves the stenosis and arrests the dyspnea. Similar instances are afforded by iridectomy, laparotomy, and many other operations.

THE IMPORTANCE OF EARLY TREATMENT. Lastly, since the circle is a self-aggravating process, it should be broken at the earliest moment. As Clifford Allbutt graphically says: "In vicious circles every gyration deepens the groove; an abnormal habit is formed so that arrest of such a local waste of energy and such a distress becomes more and more difficult. . . . The longer the 'habit'—the fixtures of organic memory—the harder the impulse needed to 'break the circle,' for the habit has become independent of the original cause, which, indeed, has often vanished." Worthy to be kept in everlasting remembrance are the words of Ovid: "*Principiis obsta.*"

Heart Disorders and the Gastro-intestinal Tract. In Huchard's words, "Quand un malade non atteint de cardiopathie organique se plaint du coeur, cherchez a l'estomac." J. F. Halls Dally's lecture is a lucid compendium of the whole subject.

1. **THE DYSPEPTIC SYMPTOMS** include, in association with non-organic and organic heart disease alike: (a) Fermentation and flatulence giving rise to displacement of the heart. Quite early there ensues passive congestion in the veins of the portal area, gives rise to catarrhal and other vicious circles. The inflated stomach pushes up the left diaphragm, and tilts up the apex and the heart into a more horizontal axis. This causes kinking of the great vessels at the base. Both emptying and filling are considerably impeded, as proved experimentally by Henderson's cardiometer attached to the exposed heart; any displacement of the apex either upward or downward causes a marked fall in the arterial, together with a rise in the venous pressure. Similarly, in man that kinking has been shown to cause a raised venous and a lowered arterial pressure.

In heart disease there is a lessened capacity for fat-absorption—either that the high venous pressure may prevent the efficient emptying of the thoracic duct, or because a high pressure in the portal system produces collapse of the lymphatics of the intestines. Further, the disordered circulation affects the functions of other organs, and these disturbances react upon it. The venous blood, loaded with products of disordered digestion, exerts a toxic influence upon the cardiac muscle, which leads to further failure (Fig. 17). An important vicious circle is thus established.

(b) *Heartburn* indicates excess of acid in the stomach, due either to hypersecretion of hydrochloric acid, or to the fermentative organic acids, butyric, lactic, and acetic, as well as to the gases of fermentation. Heartburn with acid eructations frequently leads to rapid heart action with frequent irregularity of pulse, as stimuli spread from the gastric to the cardiac branches of the vagus; and also to various sensory symptoms, to palpitation and to pain, brought about partly by false reference of impressions, and partly by an associated hyperesthesia of the branches of the vagus. In more severe stomach distur-

bance, syncopal and anginal crises may arise; even distention of the right heart may ensue, manifested by gallop-rhythm, an accentuated second pulmonary sound, and more or less dyspnea. Anginal attacks have been known to occur in the presence of constipation and to vanish with regular action of the bowels. Such symptoms are caused by a raised diaphragm, and probably in part by the chemical action of skatol, indol, and other products of putrefaction, upon the nerve endings in the intestine, or upon the heart muscle and cardiac nerves.

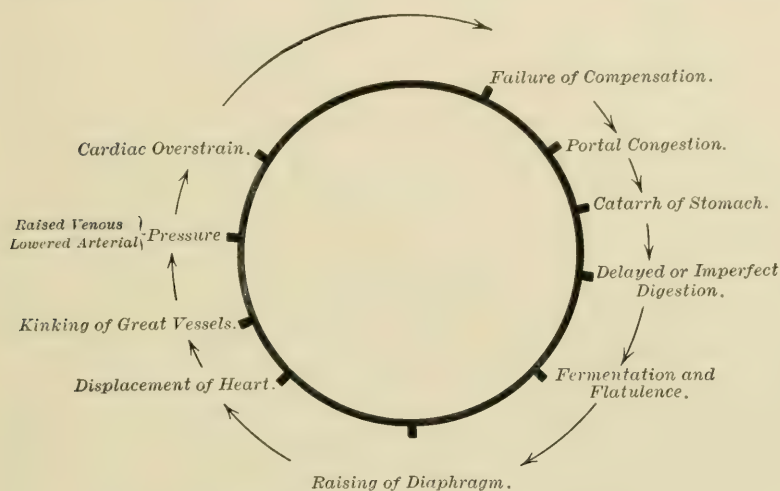


FIG. 17.—Diagram showing a cardiogastric vicious circle.

(c) *Nausea and Vomiting.* These may be due to kinking of the intestine as described by Arbuthnot Lane, especially to duodeno-jejunal kinking in association with gastric atony. In the "reflex" nausea and vomiting of heart disease, at times almost intractable, stimulation of the vagus centre in the medulla by direct irritation over the course of the *par vagum* in the neck will be far more successful than sinapisms to the epigastrium, or drugs internally, such as cerium oxalate. A. T. Brand's method is as follows: A disk of mustard leaf the size of a halfpenny (or liquor epispasticus covering an equivalent area) is applied to the skin on each side of the neck, just behind the angle of the lower jaw. As soon as the blister rises, the nausea and vomiting usually cease; and, if these symptoms should reappear after healing, a second application just below the first will usually suffice.

(d) *Constipation.* This acts in two ways: (1) mechanically, by weight dragging on the mesenteric attachments of the intestine, and causing kinking and further obstruction, and (b) by toxemia which leads to circulatory and nervous phenomena. Constipation is a potent cause of heightened arterial blood pressure, and so promotes anginal attacks.

2. PAIN IN THE PRECORDIAL AREA, AND ANGINAL ATTACKS. For one case in which pain is over the base of the heart we find ten in which this neuralgic pain is felt in the region of the apex, chiefly in the fifth left interspace often slightly outside the vertical nipple line. Remaining limited to this spot for a variable term, the pain may extend upward to the left shoulder or base of the neck, eventually travel down to the elbow or finger-tips, and may increase until it is agonizing. It cannot be regarded as an intercostal neuralgia, for the three characteristically tender spots along the course of the intercostal nerves are absent, nor is it referable to the cutaneous nerves, for tenderness is absent on gentle pressure, which is found to relieve the pain. Hence its origin is to be sought in the cardiac plexus. It may be present, apart from any motor disturbance of the heart, or may lead to increased or diminished action, in association with gastralgia, and as a visceral reflex of gastric, esophageal, and intestinal origin.

The vasomotor form of angina is frequently associated with flatulent, colicky spasms and distentions of the stomach and colon, from cold, voluminous cold drinks, meals taken at irregular intervals, bolting of food, and eating when fatigued. Pain is usually referred to the epigastric, left hypochondriac, or interscapular regions.

In regard to the intense pain radiating down one or both arms, we have to differentiate that due to aneurysm, angina, high blood pressure in the aorta, and organic disease of the heart itself in which pain is more rare. The mechanism is as follows: Any irritations of the sympathetic fibers connected with the cardiac plexuses and nerves is conducted to one of the cervical spinal ganglia, and is referred to its cutaneous brachial distribution, the peripheric nerve supply to the arm being received from that segment.

DEATH BY ELECTRIC CURRENTS AND BY LIGHTNING

The subject of A. J. Jex-Blake's¹ learned and scholarly 'Goulstonian Lectures is of growing importance, under the rapid extension of the industrial and domestic use of high power currents: the first two are devoted to the effects of the latter, the third to those of atmospheric electric discharges. The surpassing interest of the matter dealt with, and the novelty of its presentment in a condensed and yet complete form would warrant a full report; but our space only admits of a fragmentary notice of its more practical features.

Death by Industrial Currents has not yet received due investigation as to its mechanism. In that respect it might be held that the adoption of "electrocution" as the agent of the supreme penalty of the law, as first practised in the State of New York in 1890, was, from

¹ British Medical Journal, March, 1913.

the standpoints of science and philanthropy, somewhat premature. Likewise, too, our lack of knowledge and of teaching of the means of protection and of rescue is a deplorable blank in a legislation which permits an almost uncontrolled exposure to fearful risks. This is painfully obvious from the statistical estimate that 200 are killed annually by industrial currents over the whole of Europe, and probably hardly fewer in America.

ELECTROCUTION. *The postmortem evidence as to the cause of death in man* has been the main object for study, since the earliest fatality, which occurred in 1849, at the first performance of *Le Prophète* in Paris. But the lesions being inconstant have left much room for speculation.

While the supply of material grew apace, novel opportunities for study seemed to be afforded by the legal practice of electrocution; but Jex-Blake explains how this expectation was ill-founded. The upshot of various suggestions was that alternating currents of high electromotive force (1200 to 1700 volts, while Carleton recommended 3000 volts) were used with large electrodes fixed to the head, neck, arms, legs, and elsewhere. The current was turned on several times in each case, and for periods lasting up to seventy seconds or more. Each "electrocution" as it was first called in 1892, lasted from three and one-half to eight minutes. Enormous quantities of electricity were employed; for example, an alternating current of 7 ampères was maintained for seventy seconds through the body of one criminal, at a pressure of 1500 volts. Spitzka states that within twenty minutes of an electrocution the temperature of the body rises to 120° or 129.5° F. in many cases; and that coagulation of the myosin of the muscles takes place. The whole muscular system was thrown into complete tonic rigidity, we are told, when the current was turned on, and this was maintained until it was turned off. The postmortem examinations showed, among other things, extensive capillary hemorrhages in the brain and in the floor of the fourth ventricle, and it was assumed that death was due to injury to the brain. They are not a common feature after death by electric shock. It is obvious that these postmortem changes are not of much use in explaining the mode of death by electric shock in industrial accidents, in which the voltage of the current is often much less, the quantity of current passing through the body of the victim is very much less (probably rarely approaching 7 ampères), and the duration of the contact is not often more than a few seconds. As a fact, electrocutions have thrown no light on the mode in which deaths by misadventure are brought about, the special objects of the responsible authorities being to produce instant insensibility as well as certain death. It was generally supposed that death in electrocution was due to asphyxia or injury to the brain; and it has even been argued that it was the subsequent postmortem examination, and not the

electrocution, that was the real cause of death, a view upheld again and again from time to time in the public press of America until at any rate as late as the year 1905.

THE MAIN LESIONS FROM INDUSTRIAL LESIONS include superficial burns at the points of entrance and exit, fluidity of the blood, no constant changes in the heart muscle, and capillary hemorrhages in the brain only after long exposure to powerful currents, suggesting asphyxia, or severe shock to brain and cord.

Treatment and Prognosis. In spite of all experimental work, the treatment remains much where Priestley left it in 1767; he tried artificial respiration. It is best carried out by the prone method of Schäfer, because this is the simplest and the least dangerous in the hands of the inexpert. Jellinek (1905) states that death by electric shock is in most cases only apparent death, and advocates immediate artificial respiration. When death occurs many hours or days after the shock, it is caused by the burns or thromboses or other lesions due to the intensity of the current. There may be excellent general health after very extensive and severe electrical injuries: Weiss quotes the case of a man who was so badly burned by electricity that both legs and both forearms had to be amputated, yet he subsequently enjoyed good general health.

The Theories. From the year 1890 onward, three main theories of the cause of death by electricity have held sway. The first was d'Arsonval's theory, that it was due to nervous inhibition of the heart and respiration; the second, as advanced by Tatum, to direct paralysis of the cardiac muscle by the passage of the electric current through it; the third, based mainly on the postmortem examinations of electrocuted criminals, to the hemorrhages found in the brain and bulb of the victims, and produced by the vast quantities of electrical energy employed to procure an easy death. *Fibrillation* was first observed, experimentally, by Ludwig and Hoffa in 1850.

Death by Lightning. The nature of lightning was first suspected in 1708 by Wall, from its similarity with the sparks from rubbing amber. The identity in kind between them was proved in 1752, when the experiment suggested by Franklin in 1750, was carried out in France by d'Alibard. In the United States the annual death-rate per million by lightning is high: about 700 or 800 deaths were estimated to occur by Henry in 1900 in a population of 76,000,000. But, in general, many more are struck than are killed. For instance, Weber gives an account of 92 people struck in Schleswig-Holstein: 10 were killed, 20 paralyzed, 55 stupefied, and 7 only slightly affected.

The voltage of a flash a mile long has been estimated by Lodge at 5,000,000,000 volts.

The quantity of electricity (in "coulombs") was believed by Faraday to be quite small.

The rate of flow or "ampèreage" is large.

The duration (Schmidt), $\frac{1}{5000}$ of a second for simple flashes, may last for multiple or oscillatory ones, $\frac{1}{1000}$ to $\frac{2}{1000}$ or even up to $\frac{1}{200}$ of a second. Lodge's estimate for a single flash is only about $\frac{1}{10000}$ of a second.

The direction and course are misjudged by the eye; two-thirds of the flashes run from the earth to the clouds; photographs show them also to be multiple, meandering, and branched.

The oscillatory character (Lodge) is, like that of the Leyden jar discharge, of enormous frequency up to millions.

The energy (in "joules") is immense; but has not been measured.

Conduction is notably different from that of the industrial currents (Lodge). Like the Leyden jar spark, lightning often leaves a good conductor to jump across a very badly conducting air-space, and may send side flashes out of lightning rods into objects near by.

THE CLASSIFICATION OF FLASHES is of popular interest. Seneca (died 65 A.D.) distinguished three varieties of lightning—the penetrating, the shattering, and the burning. Arago wrote of the "forked," the "sheet," and the "ball" lightning. They are now divided into two varieties—the A flashes and the B flashes of Lodge. The A flashes, less sudden and violent, correspond to the "cold lightning" of the Germans; the B flashes, to the German "burning lightning." No system of lightning conductors will protect against the latter. "Ball" lightning is probably the rare result of a B flash striking the ground. The "return strokes," of Mahon (1780) and Tyndall, have been rehabilitated by Lodge as "electric oscillations, overflows, or echoes" due, not to a statical disturbance of equilibrium, but to induction and electromagnetic inertia.

THE MODE OF DEATH BY LIGHTNING. Extreme suddenness is proved by the natural position of the corpse, and the placid expression. (1) *Death by failure of the heart*, perhaps with fibrillation, is assumed to be the commonest in man. The respiration may continue for a short time. The face in these instances is pale, free from congestion. (2) *Death by failure of the respiration*, from Brown-Séquard's inhibition, while the heart continues to beat until asphyxia stops it, would explain the frequency of all the postmortem appearances of asphyxia. This might be averted by artificial respiration continued till the bulb had time to recover. In non-fatal cases the patient's symptoms are those of asphyxia or of the breathing of irrespirable gases. In Nick's instance, gradual failure of the respiration became complete in about four hours. On the other hand, apparent death may last for three-quarters of an hour, yet be followed by recovery. (3) *Death by failure of the heart and respiration together* probably occurs, just as it may occur from industrial currents; but there is no evidence. (4) Except in a few cases of gross lesions of the brain the former examinations generally

failed to demonstrate pathological changes in the central nervous systems. Our more delicate modern methods would probably give positive results.

THE PROGNOSIS. Failing sudden death, the probability of recovery is large. Dechambre collected 365 instances, and found that only 15 died subsequently from late effects of the lightning. Although statistical evidence is wanting, it is generally assumed that 'immediate treatment would improve the prognosis considerably, and that many, only apparently dead, are still capable of recovery if properly treated during the next few minutes.

PROPHYLAXIS. Passing over various ancient superstitions, it is not without interest, in these days of vaccine therapy, that both Zulus and Caffres inoculate themselves against lightning by rubbing into cuts the flesh of animals (bullocks) killed by lightning. At present only general advice can be given. It is safer to be indoors than out; and a large house is much safer than a shanty. The windows and doors should be shut, and one should keep away from the walls and fireplace, as the contents of the chimney and the fireplace are often blown out into the room. A great many have been struck, in sheds and barns, when near doors or windows or in currents of air. To take refuge in a feather bed or in the cellars is not necessary as a routine.

A shed containing domestic animals is certainly more dangerous than the open. In the open, certain things should be avoided at any cost. The first is the proximity of wire fences which may carry death at a distance from the place actually struck. The second is proximity to such things as hedges, ponds, and streams, isolated trees, crowds of people, and herds of domestic animals. Crowds of people attract lightning possibly by virtue of the warmth and dampness they impart to the atmosphere. Some trees are less dangerous than others; the beech is much less often struck than any other tree in Europe; while the oak is many times (perhaps forty or fifty) more liable to be struck. At all seasons beech wood is rich in fat and poor in starchy matter. Hence, if one has to take shelter under a tree, that tree should be a beech—

"Vor den Eichen sollst Du weichen,
Vor den Fichten sollst du flüchten,
Doch die Buchen sollst Du suchen.

But one should not be near its trunk. Cover in a forest or wood is quite safe, as trees *en masse* are rarely struck. In quite open country, to lie or sit down is safer than to stand. Umbrellas should not be hoisted, and riders and drivers should dismount and not stay near their horses or conveyances. Clothes thoroughly wetted by rain may give some protection; but in seven well-recorded instances the effect of the stroke was to blow practically all the wetted clothes off the

body, by the generation of steam it would seem; and three of the seven were killed.

THE TREATMENT. Persons struck and apparently killed should at once be given plenty of fresh air; their clothes should be loosened, and Schäfer's or Sylvester's method applied, and continued until either recovery occurs or cooling of the body and *rigor mortis* prove that death has taken place. Bleeding, recommended long ago, might well be of service when the heart goes on beating while the respiration stops. If immediately available, to give strong electric shocks to the precordia would be well worth trying in desperate cases. In regard to other remedies—such as stimulants in all forms, hot or cold applications, the inhalation of pungent vapors—very many have been recommended, but none seem to have met with any success.

It is highly improbable that anyone of us will be struck by lightning. But, for the benefit of those who might be struck and survive, we may mention the French superstition that such people have for forty days the power of curing all kinds of disease by "touching," and quote the case of a girl, aged eight years, who was struck at Douai and afterward "touched" over 600 persons in this way, and whose parents did not refuse the modest offerings presented by the visitors. In conclusion, a consoling thought is taken from the diary of Queen Victoria: "I told Lord Melbourne I never could forgive him for having stood under a tree in that violent thunderstorm at Windsor last year; he said, 'It's a hundred to one you're not struck,' and then added smiling, 'It's a sublime death.'"

DERMATOLOGY AND SYPHILIS

BY WILLIAM S. GOTTHEIL, M.D.

DERMATOLOGY

The Nature of Alopecia Areata. Since Sauvages, in 1763, first established this affection as a disease entity, its etiology has been a vexed question. Theories of a parasitic, a trophoneurotic, and an intoxication cause have all had their advocates; the facts, in individual cases or in special series of observations and investigations, favoring now the one and again the other of these suppositions. Dermatological opinion is fairly equally divided on the subject. To mention only the more recent investigators, Sabouraud and Lassar advocate the parasitic theory; though calm judgment must decide that the pathogenicity of the various microörganisms described has not been proved, since they are found on normal scalps, and neither the histological nor bacteriological investigations have been decisive. The epidemics of the disease that have been noted by competent observers are the main reliance of the advocates of this explanation of the disease. The trophoneurotic theory first advanced by Bärensprung has found its chief modern advocate in Joseph, who produced an artificial alopecia in animals by excision of some of the spinal ganglia. Baldness of the same type has been observed in man in a number of cases after varied injuries to the nervous system. A dystrophic theory has been advocated by Jacquet, who has observed and collected a number of cases occurring in connection with developmental anomalies of the teeth and the bones of the jaw. Buschke and Bettmann, on the basis of the alopecia areata occurring after the exhibition of thallium acetate and abrin, developed an intoxication theory of the etiology of the disease; and it seems to be proved that under certain circumstances this may be true. Pohlmann¹ has lately thoroughly reinvestigated the whole subject, both from a critical, historical, and experimental point of view; his conclusions are of interest, since they represent the necessary, if not very satisfactory position that we must, at the present time, assume. They are as follows:

The characteristic falling of the hair known as alopecia areata forms a definite symptom-complex which is easily and always differentiable

¹ Archiv f. Dermatologie u. Syphilis, February, 1913, p. 633.

from all other forms of baldness. Most of the cases cannot be regarded as occurring otherwise than by the inoculation of an as yet unknown form of contagion. Occasional cases occur in which a traumatic and neurotic origin is apparently proved, and in which an infection can be excluded; these cases are absolutely indistinguishable, clinically, from those of the first class. Finally, in rarer cases, toxic causes may occasion the appearance of a precisely similar baldness.

Alopecia areata, therefore, is a peculiar form of falling of the hair that is most often due to contagion, occasionally to traumas, especially of the nerve structures, and exceptionally to intoxications. This leads us to the therapeutic conclusion, which is borne out by the results of practical experience, that, in the great majority of cases, antiparasitic treatment is the most effective that can be employed.

The Etiology of Eczema and of the Pyodermias. Our ignorance of the causative factor in many of the commonest dermatoses has long hindered the development of a rational therapeutics, and has been a cogent, though undeserved, reproach to our specialty. This is notably the case with such affections as eczema and psoriasis, in which we must either confess our ignorance to inquiring patients, or give a pseudo-explanation to satisfy them, if not ourselves. Often we are compelled to speak of uric acid in the system, or of a bacterial infection, when, as a matter of fact, we are entirely in the dark as to the agency or agencies that are at work. More than ten years ago I¹ called attention to a series of investigations in this special line that promised well; but the results of Bockhart, Bender, and Gerlach were not confirmed, and no advance has been made in our knowledge of the subject.

Recently, Cole² has carefully reinvestigated the entire subject from a modern bacteriological standpoint, his object being to determine the influence of ordinary infections in causing the tissue changes that we recognize clinically as eczema, especially in regard to the influence of streptococci and their hemolytic relations. The results of his thorough studies may be summarized, so far as they interest the practitioner, as follows:

1. In acute eczema, the vesicles are either sterile or contain staphylococci. In the moist and impetiginous eczemas, staphylococci or staphylococci and streptococci are most often present; rarely are there streptococci alone.

2. Impetigo contagiosa, impetigo vulgaris, and ecthyma are pure streptococcus diseases.

3. In pityriasis simplex there are no streptococci at all.

4. Artificial dermatitis, even the typical suppurative follicular ones occasioned by croton oil, are sterile both microscopically and culturally.

¹ PROGRESSIVE MEDICINE, September, 1901, p. 159; September, 1902, p. 164.

² Archiv f. Dermatologie u. Syphilis, March, 1913, p. 207.

5. Neither the microscopic nor cultural investigations of eczemas and the related dermatoses gave any ground for the belief that the staphylococci and streptococci found on the surfaces of such lesions had any causative influence on their development.

6. The attempts to repeat the experiments of Bender, Bockhart, and Gerlach, Neisser and Lipstein, and others, and to occasion eczematous lesions with staphylococcus filtrates have given exceedingly irregular and indeterminate results. Irritation coincident with the application seemed in some cases to favor, and, in others, to hinder the development of reaction; sometimes it seemed to have no influence at all.

Under the conservative title of "Speculations" as to the cause of eczema, Johnston¹ read a paper at the Thirty-sixth Annual Meeting of the American Dermatological Association last May. Excluding specifically from his consideration the eczematoid, staphylococcic disease described by Engman, Fordyce, and others, which has been elicited by staphylotoxin vaccinations and whose origin is sufficiently established, he limits his consideration to the true dermic catarrh, with an exudate of serum and lymphocytes, which goes through all or several of the stages of erythematous inflammation, vesiculation, serum exudation, leathery thickening, and lichenification. This is admitted by all to be true eczema and to the theories and ideas as to its etiology the author devotes his attention. Taken up in order these are:

(a) *Parasitism*. Unna and his followers have been the chief advocates of the bacterial origin of the disease; and the authority of these investigators have kept the controversy alive longer than the evidence in favor of it warrants. Not only have Koch's postulates not been fulfilled, but absolutely negative results have been obtained by many investigators, as by Török, Jadassohn, Galloway, Sabouraud, and many others. The primary vesicle of eczema is either sterile, or it contains only the staphylococcus albus, which must be regarded as an accidental contamination. No advance has been made from the standpoint of Neisser at the Paris Congress of 1900, when he said that the sterility of the primitive lesion of eczema appears to be demonstrated. In the later stages of the disease, secondary infection complicates the picture, and gives us the impetiginous and chronic forms. Johnston suggests that in future investigations the use of the method of complement deviation may be of service.

The primitive lesion and the patient's blood being acknowledgedly sterile, and external excitants operating effectively only in a small number of the possible cases, the cause of the disease must be found in the body that carries it; this seems at present to Johnston to be a hopeless task. Nevertheless, it will be of some use to exclude certain ordinary assumed causative agents.

¹ Journal of Cutaneous Diseases, January, 1913, p. 3.

(b) *Disorders of Digestion.* The usual dermic reaction to gastro-intestinal intoxication is the dilatation of the bloodvessels of the face known as rosacea, together with affections of the sebaceous glands. These do not in the slightest degree resemble eczema. While some form and degree of gastric disturbance is found in a large number of cases of true eczema, most of them, on the one hand, run their course without anything of the kind, and, on the other, the most serious gastro-intestinal disturbances go on without it. It may be admitted, however, that such disturbances may prolong an eczema, and increase its severity.

(c) *Elimination.* This is apparently as well carried on in eczematous as in normal subjects. The balance from the enormous water loss in a general eczema is readily established, and the kidneys are never structurally injured. Cardiovascular-renal disease itself influences eczema as little as indigestion.

(d) *The Nervous System.* Demonstrable lesions of the central, peripheral, or sympathetic nervous system are as rare as those of the kidneys in eczematous patients. Eczema has never been provedly produced by fright, worry, or fatigue; yet it may possibly be that faulty innervation of the sympathetic, which has demonstrable effects in regard to digestion, may result in functional disturbance elsewhere in the body. A functional derangement of visceral innervation that may cause the elaboration of a poison specific to the skin is entirely without proof; and the term "neurotic eczema," as usually employed, is entirely improper.

(e) *Intermediary Elimination.* In eczema the metabolism of the inorganic compounds is in equilibrium. It is not concerned with the metabolism of the carbohydrates or fats; and Johnston, in many examinations, did not find acetone or reducing bodies in the urine. Nitrogen metabolism only is left to consider. Is the poison of eczema elaborated in the course of anaphylactic shock, or in the failure of urea synthesis?

(f) *Anaphylaxis.* Hektoen¹ has advanced this theory of eczema causation, which Brück has proved for urticaria. The idea is attractive; but the difficulties in the way of its experimental determination are very great. None of the symptoms of allergie, however, or very few of them, agree with those of eczema. In the former, the time relations are definite; the first symptoms begin eight to twelve days after the serum injection; they continue for a few days and the stage of refractoriness sets in for a period; after this, sensitiveness gradually returns. This is not the history of eczema in any form. The immediate symptoms of anaphylactic shock (serum disease), lowered blood pressure with rapid pulse, depression, dyspnea, rise of temperature, nausea, vomiting, diarrhea, joint pains and swellings, local and general edemas,

¹ Journal of the American Medical Association, 1912, No. 15, p. 1081.

headache, leukopenia, lessened coagulability of the blood, and loss of the complement with tendency to hemorrhage, together with the appearance of urticaria or erythema, are entirely different from an onset of eczema. Here the temperature is most often subnormal, any rise not exceeding one degree, the pulse is never rapid, the blood pressure tends to rise, gastro-intestinal symptoms are usually absent, joint symptoms and edemas do not occur, there are no hemorrhages, the coagulability of the blood is not diminished, instead of a leukopenia there is a leukocytosis up to 10,000, and an eczema, not an urticaria or an erythema, has resulted. Johnston rightly concludes that there is too wide a divergence between the symptoms of eczema and allergy to permit of their being linked together.

(g) *Failure of Urea Synthesis.* Schwartz and Johnston have carefully considered this factor elsewhere three years ago, and nothing has been discovered to alter their opinion then expressed. Disorder of the urea synthesis occurs in eczema sometimes, as in every other disturbance of nitrogen metabolism at times, but it is not and cannot be basic. It makes an eczema worse, as the local irritation of an indigestion does; but it occurs in many other conditions without the production of an eczema, and in fact may be present in perfect health.

(h) *Conclusion.* By this process of exclusion Johnston concludes that the cause of eczema may be narrowed down to some derangement of the nitrogen metabolism, neither anaphylactic nor a defective synthesis of urea, but occurring where at present biochemistry cannot demonstrate it.

At the same meeting, Knowles¹ considered in detail the external causes of eczema, turning his attention to a different class of cases from those considered by Johnston. It would be better, I think, to call these cases dermatitis rather than eczema; their clinical and microscopic pictures are the same, and the difference in designation would serve to accentuate those of known external from those of unknown internal origin. In general, his conclusions coincide with those of the other reporter.

In the discussion that followed the reading of the papers, Hartzell voiced the sentiment, with which I fully concur, that during the past century we had not learned a single positive new fact of importance regarding the internal causation of eczema. When a committee reports progress it usually means that it has done nothing. In this case, dermatologists have done an immense amount of work, but the results have been practically nothing. In regard to the etiology of the commonest of all dermatoses, we are as much in the dark now as ever.

Hereditary Dystrophy of the Hair and Nails. Eisenstaedt² records 3 cases of this rare developmental anomaly, of which the literature

¹ Journal of Cutaneous Diseases, January, 1913, p. 11.

² Journal of the American Medical Association, January 4, 1913, p. 27.

contains only two other sets of cases, 1 in France reported by Nicolle and Hallipré,¹ and another in this country by White.² They occurred in a family of 9 children, 8 of whom were living and in good health. The mother, who was dead, had been affected with the anomaly; and investigation showed evidence that a grandfather, a great-grandmother, and a great-great-grandmother had also had it. Three children, of the 8 living of the present family, showed the defects, all being boys.



FIG. 18.—Hereditary dystrophy of the hair and nails. (Eisenstaedt's case.)

The eldest, aged fourteen years, showed the most marked lesions, and may be taken as a type of the rest. His scalp was moderately covered with downy hair only, not over two inches in length, though it had not been cut for many months. The hair grew very slowly, and could be readily removed without breaking by traction; there were no parasites or disease of the scalp itself. The eyebrows were extremely sparse, and were composed only of lanugo hair. There was no trace of axillary or pubic hair. The other defects were in the nails of the

¹ *Annales de dermatologie et de syphiligraphie*, 1895, vi, 804.

² *Journal of Cutaneous Diseases*, 1896, p. 220.

hands and feet. The distal phalanges were all enlarged, and all the nail beds were enormously hypertrophied. The nails themselves had to be kept very short, because they were very brittle, and broke and split on the slightest trauma. The nail plate itself was not striated, and seemed unchanged save for the thickening and brittleness. This patient had an erythematous lupus of the face; but neither he nor the other affected children showed any traces of heredosyphilis or other systemic infection. The condition is a developmental anomaly affecting the hair and nails, and is evidently closely related to the hereditary keratosis of the palms and soles, of which a number of cases are now on record. In this instance, members of five consecutive generations had been affected. Mental deficiency, which was recorded as present in the previous sets of cases, was not noted here; nor was the thyroid absent. Nevertheless, some obscure fault of metabolism is evidently its cause; and Eisenstaedt believes that a better understanding of this process, and of the functions of the internal secretions of the thyroid, pituitary, testicle, and ovary will ultimately throw light on the subject. I append the picture of the oldest boy (Fig. 18).

Gangosa and Frambesia. A great deal of uncertainty has surrounded these, as other tropical diseases in the past; recent investigation, however, has elucidated the mystery in many cases, the mosquito, the tsetse fly, the hookworm, and the filaria accounting for some of them, and the syphilis organism itself for others.

Concerning *frambesia* or *yaws*, or *pian*, or *verruca Peruviana*, a contagious disease, most of the cases of which have been observed on the west coast of Africa, a contest was long waged as to whether it was a tropical form of syphilis, or an affection *sui generis*. In a general way, its symptoms resemble those of lues; there is a period of incubation, followed by general symptoms, fever, glandular swellings, rheumatic pains, and an eruption, usually tubercular or warty, on the skin. Ulcerations, and mucosal lesions similar to the moist patches of syphilis are also seen; the disease lasts months or years, one attack protects against future infections, and salvarsan has been found to be practically a specific for it. The parasite found by Castellani, the *Spirochete pertenuis*, apparently distinct from, though closely related to, the pallid spirochete, is accepted today as its cause; and its semiology, and more especially the differences that distinguish it from syphilis, are being thoroughly worked out.

The reverse process has recently taken place with *Gangosa*. The cases of this mysterious disease have been reported from Guam, our lately acquired island in the Pacific, and were first described by Mink and McLean.¹ It is characterized chiefly by ulcerative lesions of the throat, the back of the nose, and the nares, which were at first supposed to be syphilitic; as the therapeutic test, however, was apparently

¹ Journal of the American Medical Association, October 13, 1906, p. 1166.

negative, this idea was abandoned, and other explanations were sought, though in vain. Kerr¹ has reinvestigated the subject lately, and has found that not only do these cases give a positive Wassermann, but they yield to antisypilitic treatment when vigorously and thoroughly carried out. We may regard it, therefore, as proved that gangosa is simply a tertiary gummatous form of syphilis, while yaws is a closely related but different infection occasioned by the spirochete *pertenus*.

Thallium and Pumice Stone in Hypertrichosis. Excessive hair growth on the female face is an unimportant deformity from a medical point of view; for the unmarried female patient, however, it is of serious import, often leads to psychic disturbance, and becomes a real misfortune. These patients come to us for relief from what to them is a serious condition; and to dismiss their trouble as unimportant merely drives them into the hands of quacks and beauty doctors.

In the review of 1911,² the various points in connection with electric epilation and x-ray depilation were considered at length, and their disadvantages of tediousness, pain, and the danger of causing atrophic changes in the treated skin were referred to. Neither method can be considered entirely satisfactory; and any new suggestions are, therefore, welcome. Two such have been recently proposed.

Schwenter-Trachsler³ claims to have gotten excellent results from the use of ordinary *pumice stone*. Twice daily the hypertrichotic zones are thoroughly rubbed down with the stone; this is kept up for six months, and then a month of rest is taken; after that another six months of treatment is given. The author says that this will permanently cure hypertrichosis in a year. I cannot see how it can possibly do anything but destroy, by friction, the portion of the shaft projecting above the surface of the skin, leaving the root to grow on unchecked. I have tried it myself in a single case only; the result was to irritate the skin and apparently to stimulate the growth of the lanugo hair. This was the very opposite of what was intended, and I have not considered the method worthy of any further trial.

The suggestion of the employment of the *acetate of thallium* in hypertrichosis comes from Sabouraud, and is hence worthy of more serious consideration.⁴ It will be remembered that, in 1897, Sabouraud reported a number of cases that showed that this drug has an energetic action upon hair growth. Experimentation enabled him to conclude that by administering 0.02 centigram of the drug per kilogram of body weight, in ten to twelve days there usually, though not invariably, occurred an alopecia that became complete. He attempted to utilize this property for the treatment of ringworm, employing the drug not

¹ U. S. Naval Medical Bulletin, April, 1906, p. 1166; 1913, p. 188.

² PROGRESSIVE MEDICINE, September, 1911, p. 117.

³ Annales de dermatologie et de syphiligraphie, December, 1912, p. 725.

⁴ La Clinique, February 16, 1912, p. 102.

only internally, but externally as a 10 per cent. ointment also. He obtained complete depilation in fourteen days; but he was compelled to abandon the method on account of the by-effects—salivation, tachycardia, subcutaneous ecchymoses, and albuminuria—that occurred. Latterly, he has been using the acetate of thallium externally in hypertrichosis with excellent results, according to the following formula: Acetate of thallium, 0.3; oxide of zinc, 2.5; vaseline, 20; lanoline, rose water, āā, 5. The regular employment of this cream every evening is especially indicated for the lanugo growth of fine hair on the upper lip and the cheeks, where electrolysis is out of the question. It takes many months to get results; but the remedy is worth trial in the absence of any other means save the x-ray, which has dangers of its own. I have had no experience with it myself. According to Sabouraud, it never has any injurious effect on the skin or hair.

Blennorrhagic Keratosis. The general subject of gonorrheal eruptions has been referred to in the last two issues of this review.¹ They are apparently very rare, though it is quite possible that, as in other cases, this rarity is apparent rather than real; we are not accustomed to correlate skin eruptions on distant parts of the integument with a present or past gonorrhea, and it is quite possible that a number of these cases are overlooked or misinterpreted. I am, therefore, glad to present an illustration of a case recently observed by Roark, which is the second case reported in America, and only about the twenty-second recorded in medical literature.²

The patient was a man, aged twenty-six years, with an acute gonorrhea and a horny, papular eruption on the soles of both feet. It had appeared on the tenth day of his urethral infection, appearing as about forty nodular areas on the soles of the feet, which were so tender as to render walking impossible; at the same time his left ankle became greatly swollen, painful, and tender. His temperature was 101°, and he had the symptoms of a mild toxemia. The soles of his feet were covered with horny epidermic masses evidently belonging to isolated lesions, though over most of the area they were so large as to be apparently confluent. Removal of the horny mass over one of these revealed a disk-shaped gelatinous mass, yellowish in color, and putty-like. Under this was the original soft pink papule (Fig. 19).

During the four and one-half months that the patient remained in the hospital he had afternoon temperatures up to 101.8°, and arthritis of both knees, the left hip, the second joint of the right middle finger and of the right elbow showed itself. The keratosis of the soles spread in extent, and the toe nails became thickened and were finally cast off. A number of small papules appeared on the dorsa of the feet and on the back; and here the development of the keratotic lesions

¹ PROGRESSIVE MEDICINE, September, 1911, p. 116; September, 1912, p. 117.

² Journal of the American Medical Association, December 7, 1912, p. 2039.

could be accurately studied. There was always a little drop of yellowish mucoid secretion under the thickening epidermis. Gradually in a few days the papules enlarged into waxy, horn-like nodules similar to those on the soles, but they never got as large as the latter, nor did they become confluent. The finger nails became thickened and involved, and were finally exfoliated in part.



FIG. 19.—Blennorrhagic keratosis. (Roark's case.)

The bacterial examinations were not decisive; smears from the yellow waxy material of the early lesions showed no microorganisms. Cultures were unsuccessful. The treatment consisted of the administration of gonorrheal mixed vaccine (stock), and also of an autogenous vaccine of cultures from the feet (*Staphylococcus aureus* and *albus*); and in spite of a negative Wassermann, 0.6 gram of salvarsan was administered intravenously. For a time the prognosis of the general infection looked rather hopeless, though Roark believes that the administration of the gonorrheal mixed vaccines was of some benefit. The patient finally began to improve, and then made a rather rapid convalescence. One interesting point was elicited from the history. In June, 1908, while he was suffering from an acute gonorrhea and gonorrheal rheumatism, he had had many horn-like nodules on the

soles of his feet, which disappeared spontaneously with his convalescence from the gonorrhea and rheumatism.

The absence of gonococci from the skin lesions is not to be wondered at, since that has usually been the case. The report makes no mention of the blood findings or cultures, which is to be regretted; but a sufficient number of these cases have now been recorded and studied to make the etiological relationship of these keratotic dermatoses of the soles and palms to gonorrheal systemic infection evident.



FIG. 20.—Neurofibromatosis; deep-seated form. (Traube's case.)

Neurofibromatosis. This condition was referred to in this review several years ago¹ in connection with a case reported by Wynn, in which the large pedunculated tumor masses were distinct outgrowths from the perineurium of the peripheral nerves. Trimble² has recently reported 5 personal cases, 2 of which were mother and daughter.

¹ PROGRESSIVE MEDICINE, September, 1906, p. 115.

² New York Medical Journal, February 15, 1911.

They were all instances of the ordinary type of the disease, which, especially in its moderately developed form, is not very uncommon, and differed entirely in appearance from the rarer variety previously recorded. Von Recklinghausen, who made the first extensive study of the condition, believed that the tumors in all cases originated from the connective tissue sheaths of the nerves; later investigations have shown that in many cases placed under this general syndrome the

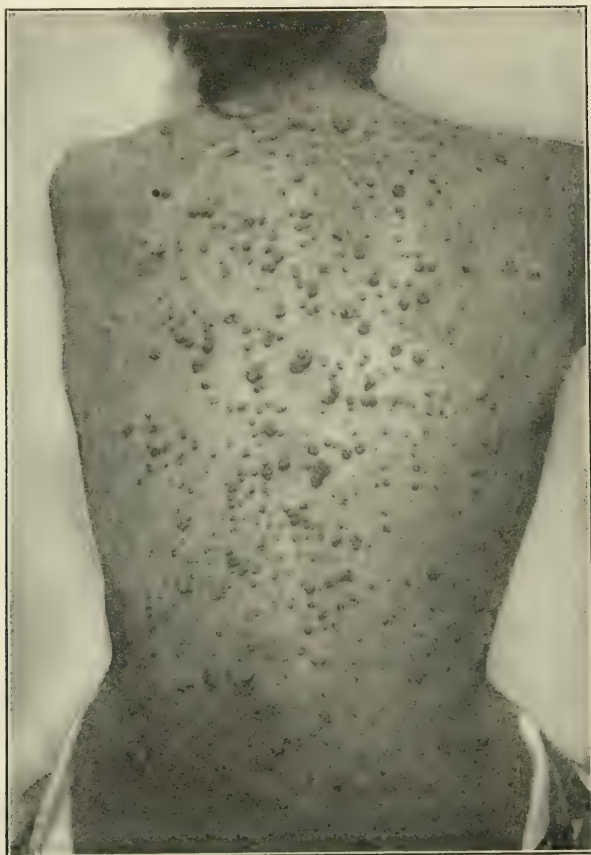


FIG. 21.—Neurofibromatosis; pedunculated and pigmented form. (Traube's case.)

growths develop from the periglandular or perivascular connective tissue. The small pigmentations that often form a prominent feature of the disease picture, and which undoubtedly develop in the course of time into tumors, are evidence that other factors besides simple fibromatosis are involved; as are also the facts of heredity in the abnormality noted by many observers and defective development in various body structures, notably the nervous system and the mentality. Weber's attempted classification, based upon the presence or absence

of pigmentations and exostoses in addition to the cutaneous tumors, does not help us much. For the present we must look upon these cases as due to some developmental defect or abnormality of the connective tissue in some portion of the skin, with occasional abnormal pigment deposit and true fibromas of the nerve sheaths, and often accompanying defective mental development. We are entirely in the dark as to their real etiology. In addition to Trimble's cases, I append a picture of a case which was in my service at the City Hospital some years ago, and in which there was canities as well as the ordinary neurofibromatosis.

Parapsoriasis; Its Relations to Psoriasis, Eczema, and Seborrhea. In a previous issue of this review, a peculiar group of dermatoses was considered under this provisional designation,¹ and in a recent article² I have considered the subject from the standpoint of the additional experience gained in the meantime. It is not for want of study, indeed, that the sections on etiology of so many of the commoner dermatoses are practical blanks in our text-books. Neither pathological research nor experimental investigation of the most painstaking kind have as yet revealed to us the causative factor in such very common skin affections as eczema, psoriasis, and seborrhea. Treatment is therefore necessarily empirical, and diagnosis and classification are both unsatisfactory and subject to change. Our terminology, also, for the same reason, is open to just and serious criticism. In the absence of any real knowledge of the pathogenetical processes underlying these everyday affections, it is inevitable that attempts at progress should be made by means of minute objective study. Hence arise the differentiation and classification as separate affections of morbid phenomena that may be etiologically and fundamentally the same; with the consequent multiplication of diseases, or at all events of disease names, to the confusion of the general practitioner and even of the specialist. The immediate need of the future in dermatology is synthesis, and not analysis; a correlation of disease types, and not a description of new ones; a simplification of the terminology upon a rational, and as far as possible, a uniform basis, and not the introduction of new ones. If now I run counter to this evident need myself in insisting on the validity and usefulness of the term parapsoriasis, it is because experience shows ever more and more that some other designation than eczema, psoriasis, or seborrhea is absolutely required for a common class of cases, which may at times resemble one or another of these ordinary affections, may change its likeness from one to another, and which presents characters that differentiate it sufficiently from all of them to prevent our simply ranging it in line as an aberrant example of the better-known affections.

¹ PROGRESSIVE MEDICINE, September, 1911, p. 122.

² Archives of Diagnosis, June, 1913.

Clean-cut and typical cases of eczema, psoriasis, and seborrhea are, of course, outside the limits of our present consideration. Well-defined instances of diffuse superficial catarrhal inflammation of the skin, with acuminate papules or vesicles, reddened and moist surfaces, or dry, thickened tissues, are eczematous pure and simple; pinkish-red, superficial, more permanent infiltrations of varying size and covered with silver scales are psoriatic without doubt; and excessive sebaceous secretion, either in the form of fluid fat or of fatty scales diffused over the surface with but little evidence of inflammatory action, is the indubitable mark of a seborrhea. But, in a large proportion of cases the disease phenomena are not so clearly defined and differentiated; the objective appearances are indefinite, or show signs of more than one of the above affections at different times, or at the same time. The practitioner is confused; and the specialist is compelled to make two diagnoses, or to classify the case as a "boundary line" one, or, worst of all, to admit the possibility of entirely different diagnoses being made by different observers in accordance with individual prepossession. Any one of these courses is practical admission of inability to make a diagnosis. The records of our dermatological societies show conclusively that the number of these cases, or, rather, the frequency of our recognition of them, is increasing; and they present certain features in common that are sufficiently distinctive to render it both possible and desirable to place them in a class by themselves, entirely apart from the ordinary affections. And the practical importance of the differentiation lies in the fact that effective treatment of the class of cases in question is along lines entirely different from that of eczema, psoriasis, and seborrhea.

Unna long ago called attention to the circumstance that many cases of the affection that we called at one time seborrhea and at another eczema did indeed show characteristics of both affections at different periods of the disease or at the same time; that in many cases of the former there was a distinct inflammatory reaction of the affected skin, as well as the secretory disorder; and that, in addition, the cases in question often showed phenomena unusual in either disease, namely, a sharply defined margin, a tendency to reggression and lightening up in the centre, and a very slow peripheral growth. He proposed the designation of seborrheal eczema for these cases, and claimed to have discovered a distinct and characteristic microörganic cause for them. The name has gained universal acception, though the etiology is still disputed; and today the diagnosis of seborrheal eczema or seborrheic dermatitis is perhaps as commonly made as that of eczema or seborrhea alone. In fact, the pendulum, as usual, has swung too far; a seborrheal element is seen in almost every case of eczema, and cases are called seborrheal dermatitis in which no trace of the former element of the name can be seen.

A similar process has been going on of late years with the many cases that are apparently on the boundary line between eczema and psoriasis, that partake of the characteristics of both affections, or that show at one time a preponderance of eczematous, at another of psoriatic features, sometimes with involvement of the sebaceous gland system as well. Dermatological diagnosis is now ready to accept these cases as entirely distinct from the other affections; and under the designation of "parapsoriasis" to recognize an independent affection with well-marked characteristics and a definite therapeutics. It is to Brocq that we owe the name and differentiation of this class of chronic, scaly erythrodermias; which, in addition to the accepted name above given, has been in the past described as *parakeratosis variegata*, *lichen variegatus*, *eczema psoriasiforme*, *eczema seborrhoicum psoriasiforme*, *dermatitis psoriasiforme*, *mycotic eczema*, and many other designations. This varied descriptive nomenclature, confusing as it is, is in itself evidence of the general recognition of the fact that here is a dermatosis that differs in essential features from the ordinarily recognized ones, and that requires a recognized name and standing of its own.

Parapsoriasis, then, is the designation accepted today for a whole class of the chronic, scaly erythrodermias that shows some resemblance at times to psoriasis, to eczema, and to seborrheal eczema, or to all of them, and that yet has distinctive features of its own that separates it from the better-known affections. In a general way it appears as pinkish papules, plaques, or larger areas, sharply circumscribed, non-infiltrated, spreading peripherally, and covered with a fine, scaly desquamation. It differs from eczema in the entire absence of inflammatory papules or vesicles, of weeping or infiltration, and of thickening and fissure formation, and also in its sharp limitation and the entire absence of itching; except, of course, in cases when an inflammatory eczematous element is added to the disease by irritation or treatment. From psoriasis it is to be distinguished by its location on the general surface of the body rather than at the sites of election of the latter disease; by the absence of the heaped-up silvery scaling, by the absence of infiltration, and by its slow peripheral spread in a manner suggestive of a mycotic affection. Finally, seborrheal dermatitis does not occur in so sharply limited papules or patches, shows distinct signs of inflammatory reaction, has a slight greasy scaling or an oleaginous excretion, and is almost always located on the chest, face, and head. One generally distinctive feature remains to be mentioned, the recalcitrance of parapsoriasis to ordinary treatment. Undoubtedly to this class belong many of the cases that we used to call atypical psoriasis, generalized ringworm, and seborrheal dermatitis, and which proved to be so little benefited by vigorous treatment on accepted lines.

Two chief forms or appearances of parapsoriasis are to be noted.

There is first the guttate parapsoriasis, in which widely spread or grouped faint pink papular lesions, with a very slight furfuraceous desquamation, resemble to some extent an ordinary psoriasis, and have doubtless been ordinarily designated as such. Then there is a parapsoriasis in plaques or patches, in which there occur one or many variously-sized and shaped, sharply-defined, spreading pink patches, with moderate scaling; this is the dermatosis to which the names of neurotic or mycotic eczema, generalized ringworm, or seborrhea, has been formerly applied.



FIG. 22.—Guttate parapsoriasis. (Gottheil's case.)

It may be useful to append in tabular form the chief features that differentiate parapsoriasis from the affections that most resemble it:

1. Appearance as sharply limited papules or larger patches (up to several centimeters in diameter) of a pale pinkish color, entirely without infiltration, with no signs of inflammation in the shape of acuminate papules or vesicles, and with a slight furfuraceous desquamation.

2. Slow peripheral growth, without any itching, and extreme chronicity.

3. Recalcitrance to all ordinary treatment for eczema, psoriasis, or seborrhea.

The pathology of parapsoriasis has been abundantly studied, without, however, adding anything of practical importance to our knowledge of the disease. As a matter of fact, pathological and bacteriological investigation, in the ordinary acception of these terms, is apparently at the limits of its usefulness in all the ordinary and many of the rare dermatoses. The findings of the various investigators, while by no



FIG. 23.—Parapsoriasis in plaques. (Gottheil's case.)

means uniform, differ only in minutiae that seem to have no practical significance, and that do not promise to help us either to understand the nature of the affections in question better, or to treat them more intelligently. Some radical improvement or change in methods, or the opening up of some collateral line of investigation which will throw light on these subjects from other points of view must come before the unending quantity of work that has been done and is being done in these directions will bear any useful fruit. The pathological histology of parapsoriasis presents the picture of a subacute inflammation

of the skin with special involvement of the veins, so that phlebitis and periphlebitis is markedly in evidence. Its etiology is entirely in the dark. Civatte believes it to be an atypical tuberculosis of the skin; but this view is not generally accepted, and it would seem more probable, from its semiology, that it is a parasitic affection, perhaps more closely related to seborrheic dermatitis than to any other skin affection.



FIG. 24.—Parapsoriasis in plaques; later stage. (Gottheil's case.)

The difficulty in successfully treating the disease is dwelt upon by all investigators; I can add my testimony to that effect. Indeed, the fact that a dermatosis presenting some of the features above mentioned, and resembling in many points ordinary and perfectly tractable affections, proves absolutely resistant to a therapeusis that should give satisfactory results, is a not unimportant element in the diagnosis of the disease. My own experience is to the effect that the tar preparations, together with parasiticide drugs, possibly aided by the x-rays, give the best results. I use a 3 to 8 per cent. betanaphthol-simple cerate ointment, or the liquor carbonis detergens of the *British*

Pharmacopæia. In conjunction with this, I expose the affected surfaces for short periods at short intervals to the x -rays; but I should hesitate to place myself on record as to what part this latter procedure has played in the good results that I have usually slowly obtained. I append four typical pictures of the disease, one of the guttate parapsoriasis (Fig. 22), two of parapsoriasis in plaques (Figs. 23 and 24), and, finally, one of the later, more extensive involvements of the integument by the disease (Fig. 25).



FIG. 25.—Parapsoriasis in its last stage. (Gottheil's case.)

Salvarsan in Leprosy. The remarkable symptomatic results obtained with the intensive arsenical treatment in treponema infections has naturally led to its trial in other recalcitrant affections. I have myself employed it in psoriasis, without being able to convince myself that it had any very marked effect on the eruption; and this has been the experience of other investigators. Creighton Wellman,¹ in a preliminary

¹ Southern Medical Journal, iv, 11, pp. 849-851.

communication, records his results from the use of the drug in 7 cases of leprosy, 5 of whom received treatment with salvarsan, and 2 who were injected at the same time with normal salt solution and observed as controls. There was gain in weight and improvement in the appearance of the superficial lesions; but in no case was there any clinical evidence that the bacilli in the tissues were destroyed or their activity interfered with. Creighton's conclusions at the time of this first communication were that there were no immediate injurious effects from the administration of the drug in cases that were not too far advanced, and that some clinical improvement might be expected from it.

In a later paper, the author¹ gives the laboratory findings which supported the unsatisfactory clinical results above noted. Smears of the nasal mucus before and after the injections showed no definite change, though in one case the bacilli disappeared after treatment. Blood-smears also showed no specially good effects. The urine showed no special changes. The excised specimens of tissue, of which great numbers were examined, showed, in two instances, disappearance of the bacilli; but, in the great majority of cases their number was unchanged.

Wellman summarizes the conclusions to be drawn from his careful observations and experiments to the effect that there was clinical improvement in 4 out of the 5 cases treated; the 2 least advanced cases showed the best results; in 1 case, the bacillus lepræ disappeared from the nasal secretion; 4 cases showed partial or complete resolution of the specimen nodules excised after treatment. His conclusions are as follows:

1. In cases in which the patient is not too much weakened by the disease, salvarsan may be administered without harm.
2. Some improvement may be expected, especially in early cases.
3. We have no evidence that such effect of the drug is in any way specific.
4. Arsenic has long been employed in leprosy, and salvarsan does not appear to be superior in any way to other arsenical preparations in that disease.

Human Sporotrichosis. Hamburger² has recently reviewed this subject, more especially with regard to the cases reported in this country, and has added thereto a careful study of cases of his own. Two years ago the subject was considered in these pages,³ and some account of the affection was given. It was first differentiated and described in this country by Schenk⁴ in 1898, and a second case studied

¹ New York Medical Journal, November 16, 1912, p. 996.

² Journal of the American Medical Association, November 2, 1912, p. 1590.

³ PROGRESSIVE MEDICINE, September, 1911, p. 126.

⁴ Bulletin of the Johns Hopkins Hospital, 1898, p. 944.

by Hektoen and Perkins¹ in 1900; but it was three years before the third American case was recorded. Meantime many cases had been seen in Europe following that reported by Buermann in Paris in 1903. Two hundred cases are now on record; 28 of these only are American, including the present fresh one of Hamburger's.

As a result of this fairly extensive acquaintance with the disease, it is now recognized that while sporotrichosis is generally a local skin affection only, it may become a generalized systemic infection; the sporotrichium has been found in the muscles, joints, bones, kidneys, lungs, etc., and it has been recovered from the blood by cultural methods. The American cases above mentioned include those only in which the diagnosis was proved by positive cultures; there have been recorded, in addition to this, thirty American cases in which the clinical symptoms were those of sporotrichosis, though without positive cultures. This makes 58 American cases in all, coming from fourteen States. Their distribution is interesting; North Dakota has 22, Kansas, 13; Nebraska, 5; Missouri and South Dakota, 3; New York, Illinois, Minnesota, 2 each; and California, Iowa, Indiana, New Jersey, Montana, and Wisconsin, 1 each. Neither population nor the chances of careful diagnosis of doubtful cases explain these figures, more especially when we recollect that most of the French cases have come from Paris. The sexes were about equally represented, and all ages, from three to seventy years, were affected. Occupation, however, seemed to be of importance; 15 cases occurred in farmers and farmers' children, 2 in florists, and 1 in a berry-picker; all the others were in workers in more or less out-of-door occupations, and only one was seen in the person of an indoor worker, a school teacher. Naturally, primary infection occurred most often on exposed parts; 14 times it was on the hand or wrist, against 5 times on the arm, thigh, leg, and calf. No inoculations occurred on other more protected parts. In 9 cases there was a distinct history of trauma, 2 being caused by nails, 2 by wire, and 1 each by hen-bite, blow by hammer, disk harrow, and knife. All the cases were chronic, lasting from three weeks to eighteen months. Only the culturally proved cases of sporotrichosis are considered in Hamburger's review; and in none of these American cases did systemic infection occur. This latter, of course, occasions a very wide range of symptoms, in accordance with the organ or organs involved, and cannot be considered here. It is of very rare occurrence; and the local changes are of greater immediate importance; for sporotrichosis is probably a widespread disease, especially in the country, and it is likely that many chronic ulcerative affections now called tuberculosis, syphilis, glanders, blastomycosis, and even actinomycosis, are really instances of sporotrichotic infection. Beurmann, who has had larger opportunities of observation and given more study to

¹ Journal of Experimental Medicine, 1900, v, 77.

this affection than any other authority, recognizes the following clinical varieties:¹

1. Localized sporotrichosis with sporotrichotic initial lesion, ascending lymphangitis, and local lymphadenitis.

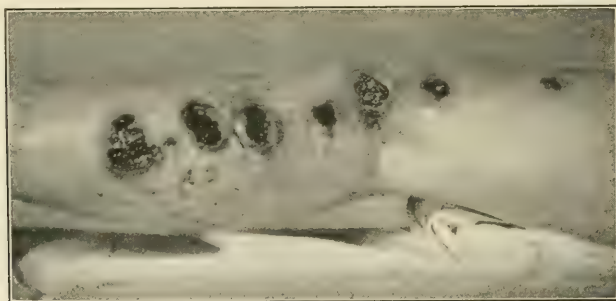


FIG. 26.—Sporotrichosis. (Hamburger's case.)

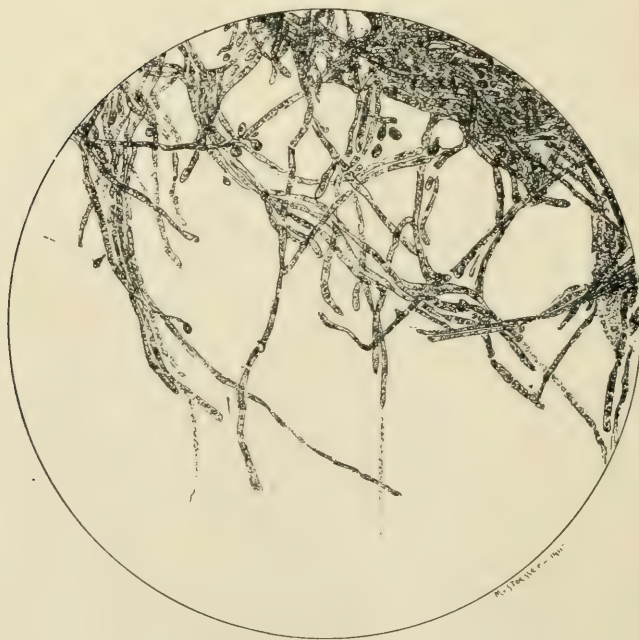


FIG. 27.—Sporotrichosis colony in plain bouillon. (Hamburger's case.)

2. Disseminated gummatous sporotrichosis, with multiple subcutaneous nodules distributed unsymmetrically; at first small, hard, rounded, painless masses, they later develop into large, soft, cold abscesses, but never ulcerate.

¹ British Medical Journal, 1912, No. 2693, p. 289.



Sporotrichium, Seven Days'
Growth. (Hamburger.)



Sporotrichium, Sixteen Days'
Growth. (Hamburger.)

3. Disseminated ulcerative sporotrichosis, with multiple polymorphic ulcerations resembling tuberculous, syphilitic, or furuncular lesion, or mixtures of them.

4. Extracutaneous sporotrichosis with localization in the mucosæ, muscles, bones, joints, ocular tissues, synovial membranes, kidneys, or lungs.

Hamburger's cases (Figs. 26 and 27) belong to the first of these classes. The clinical points on which the diagnosis can be made are, according to him, the following:

Occurrence largely in the country, though also in cities, and in persons of outdoor occupations; a history of precedent trauma, slow incubation, insidious onset, and very chronic course; slow ascending infection following the course of the deep lymphatics; the production of characteristic small, hard, round, subcutaneous nodules, all of which finally become cold abscesses or cutaneous ulcerations; the absence of pain, temperature, or any effect on the general health, save in the very rare cases of systemic involvement.

Eosinophilia has been noted in most of the cases, but it is undetermined yet whether the phenomena has any diagnostic importance. The sporotrichium grows readily, though very slowly, on 2 per cent. glucose agar at room or incubator temperature; the growth has a corrugated appearance on slant agar, and shows a radiating, flower-like growth in stab cultures; in old cultures it turns brownish black; and under the microscope its branching septate mycelium and pear-shaped spores are quite characteristic. I append some pictures of the parasitic growth from Hamburger's article. (See Plate.)

Iodine is the all-effective treatment of the infection. Using Beurmann's words: "Potassium iodide should be administered internally in increasing doses as high as 6 grams (90 grains) a day and even more, and the local lesions should be dressed with a weak iodine-iodide solution: Water, 500 grams (15 ounces); potassium iodide, 10 grams (150 grains); iodine, 1 gram (15 grains). Finally, the ulcerated points should be cauterized with tincture of iodine. The prolongation of general treatment for a month after apparent complete recovery is indispensable to prevent relapse and recurrence."

SYPHILIS

The Palatine "Anonymus." Three years ago some account was given in these pages¹ to the researches of Thibierge, Bing, and Hoffmann as to the identity of the remarkable man who, under the above pseudonym, made the remarkable syphilis inoculation experiments in the human subject that did so much to clear up certain moot points in

¹ PROGRESSIVE MEDICINE, September, 1910, p. 132.

connection with the disease. The evidence seemed to point to Dr. J. Bettinger as the man. Hoffmann¹ has recently collected all the facts on the subject now obtainable, and has proved the identity of this pioneer investigator beyond a doubt. By direct experimentation on the human subject he proved the contagiousness of the pus and secretions of secondary syphilis and of its blood; thus disproving at a stroke the theory of Ricord, which had until then been universally accepted.

The Intravenous Treatment of Syphilis. Nothing is more characteristic of the essentially and perhaps properly conservative attitude of most writers on therapeutics than the manner in which any remedial procedure, once advocated authoritatively, maintains its position through successive generations of text-books, though no one ever dreams of employing it. The endeavor to present a subject completely, to leave out nothing that anyone whose opinion is entitled to consideration has ever found useful, is responsible for the large amount of antiquated and useless material that cumbers the "treatment" sections of our manuals. The administration of mercury by intravenous injection is a case in point; and it is of special interest at the present moment, when the intravenous treatment of the disease with salvarsan is the fashion.

First proposed by Bacelli twenty years ago, Herxheimer, Mendel, and especially Blaschko have especially advocated the method. The dosage was, of course small, since the bichloride was the salt employed; and the results attained could only be called fair; so that even the most ardent advocate of the method, Blaschko, has given it up in favor of the intramuscular salicylate injections, which he has since employed. Meyer² has lately recorded his experiences with the intravenous administration of certain organic mercurial salts in much larger doses, following the methods employed with the newer arsenical preparations. He was able to administer 2 to 10 c.c. of a 2 per cent. solution of *afridol*, which is the sodium salt of oxymercuricotoluic acid, and contains 53 per cent. of mercury, or of *enesol*, a soluble compound of mercury, salicylic acid, and arsenic containing 38.46 per cent. of mercury and 14.4 per cent. of arsenic. This means from 0.06 to 0.115 of metallic mercury, as against 0.009 of mercury in the maximal dose of corrosive sublimate that can be given; twelve times as much. The interesting point is made, that, although the patients did fairly well for a time, the ultimate results were disappointing; and it was especially noticeable that what are termed relapses, but which should rather be designated symptoms of persisting virus activity were frequent and occurred early. There was neither a powerful influence on the symptoms of the disease, such as we see from mercury properly given by other methods and from salvarsan; nor did the serum reaction change promptly.

¹ Dermatologische Zeitschrift, December, 1912, p. 1043.

² Ibid., xix, Heft 5, p. 393.

I do not think that Haldin Davis¹ conclusions from these experiments, to the effect that they show that the action of mercury is quite different in principle from that of salvarsan, the latter being a direct antidote or poison to the spirochete, while mercury has only an indirect action in influencing the tissues in an advantageous manner in their struggle against the syphilitic poison, can be accepted. Both drugs seem to act in precisely the same manner; they are immediate spirochete antidotes or destroyers. Salvarsan, as now administered, is more immediately powerful in most cases; but it is also more fugacious in its effects; symptoms reappear with greater rapidity after its administration than after the proper exhibition of mercury. Hence not a single dose of salvarsan, but a series of doses, and not salvarsan alone, but salvarsan and mercury together, is the accepted rule in the treatment of syphilis. And if any one thing has been proved in syphilotherapeutics, it is the advantage gained by administering mercury in such form and in such a manner that a continuous stream of the drug is poured into the blood continuously for long periods of time. Hence the proved and accepted efficacy of the intramuscular injection of insoluble mercurial salts, by means of which mercurial depots are established in the system, and a continuous slow stream of soluble mercury is poured into the blood.

The tendency at the present moment is to use salvarsan more and more in the same manner that mercury is used; not to give a single dose, but a series of smaller ones at short intervals, administering mercury also by intramuscular insoluble injection. I have no desire to assume the role of a prophet; but as increasing knowledge of its actions and effects brings salvarsan and neosalvarsan nearer and nearer to the older remedies in effect, it is by no means impossible that the future will find us administering the arsenic and mercury together, either combined or separately, in long course of more moderate doses, and possibly the new as the old drug by the intramuscular method. There are already those who give salvarsan in this way; and they claim for it an efficacy equal to administration by the veins. This, as well as so many other points connected with the new drug, is for the future to settle.

Multiple and Consecutive Genital and Extragenital Chancres. I have recently reported a case of syphilitic infection that not only presents several features of special interest, but teaches some valuable lessons in regard to the treatment of the disease in its earliest stage.² In the first place, it is an example of the now generally accepted fact that the chancre, though usually a single lesion, is not necessarily so; I possess the records and pictures of a number of cases in which two, three, and four distinct hard lesions were present, and of one in which there were

¹ British Journal of Dermatology, September, 1912, p. 335.

² American Journal of Surgery, June, 1912.

not less than thirteen distinctly limited chancres occupying the entire ring of the sulcus. Attention has been called to some recorded by others in a previous review.¹ In the second place, the combination of genital and extragenital lesions is a rare one. Thirdly, the patient in the case here presented was unusually intelligent and observant, and could give a detailed account, with the dates of the appearance of the lesions. Finally, since thirty-nine days elapsed between the dates of appearance of the first and the last scleroses, the patient's skin was susceptible to the virus for that length of time after the primary inoculation, and therefore he was presumably not generally infected until after the end of that time; which is certainly an argument for a renewed trial on a large scale and with modern methods of chancre excision as a therapeutic measure. Correlating the anamnesis and the symptoms to form a connected story, the facts are as follows:

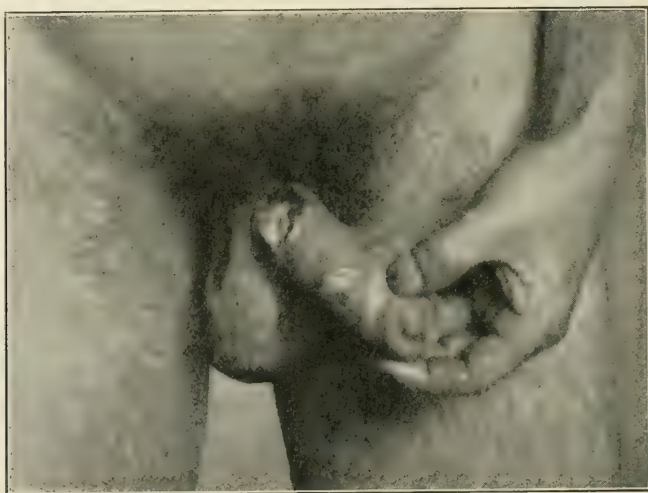


FIG. 28.—Multiple and successive chancres; the three penile lesions. (Gottheil's case.)

A. R., male, aged twenty-six years, single, and denying any previous venereal disease, was first examined May 15, 1911, and showed the following:

1. A large, deeply exulcerated, typically indurated and very slightly tender tumor on the lower portion of the inner preputial layer. This was the first lesion to appear, and it was also the largest and the most typical; the foreskin could be retracted over the glans only with great difficulty because of it; it is not shown in the photograph, but its position is indicated by the swollen preputial fold between the index finger and thumb (Fig. 28). It appeared on February 5, of this year.

¹ PROGRESSIVE MEDICINE, September, 1907, p. 125.

2. On the right side of the sheath of the penis was a large, ragged, and typically indurated lesion almost as big as the one on the prepuce; this was first seen on February 13, eight days after the advent of the preputial lesion (Fig. 28).

3. On the middle of the right side of the preputial sheath was an oval bean-sized lesion ; it was as characteristic in its hardness as the others, but showed less signs of secondary infection. Its surface was eroded merely, and it showed beginning signs of cicatrization at its edges. It appeared four days after the chancre at the base of the organ, on February 17 (Fig. 28).



FIG. 29.—Multiple and successive chancres; lesion on the cheeks. (Gottheil's case.)

4. On the middle of the left side of the patient's cheek, and near the ramus of the jaw, was an oval, filbert-sized mass, indurated and with an eroded surface. This appeared first on March 5 (Fig. 29).

5. On the under surface of the chin, a little to the left of the median line, was a small, nut-sized indurated lesion, with an eroded surface. Time of appearance, about one week after that of the lesion of the cheek, say March 12 (Fig. 30).

6. Three-quarters of an inch to the left of the last lesion and under the ramus of the jaw, was another lesion precisely similar to the last one, but smaller. As with the fifth lesion, the patient is not quite certain of the exact date of its appearance; it was after the advent of the cheek chancre, however, before that of the one on the lip, and

about the same time as the appearance of the other one on the chin (Fig. 30).

7. On the centre of his lower lip was a small nut-sized mass, very hard and insensitive, with its entire centre exulcerated, but covered with a dark colored, dry, glazed, grayish-red crust. It was a characteristic labial chancre, and the patient was quite sure that it did not appear till March 18, after the last of the other six lesions (Fig. 30).



FIG. 30.—Multiple and successive chancres; lesions under chin and on lip. (Gottheil's case.)

8. A general macular syphiloderm, slightly marked, of the existence of which the patient was ignorant.

9. A characteristic general adenopathy.

10. A syphilitic angina, to which the patient called my attention.

11. Severe nocturnal bone pains.

12. Great loss of appetite and decline in weight since the patient's trouble began; he has had to give up work on account of the progressing weakness.

13. On April 17, no antiluetic treatment having been employed on account of the patient's neglect to return to the clinic, extensive mucous patches were found on the inner surface of both lips.

The first seven lesions noted were all scleroses, as was demonstrated by their character and by the finding of the treponema, both in those of the face and in those of the genitals. Thirty-nine days elapsed

between the dates of the appearance of the first lesion on the genitals and the last upon the lip; and both were situated in locations where they would naturally attract immediate attention. The development and appearance of the various chancres correspond with the patient's history of them. The oldest ones were the largest; the one on the middle of the sheath of the penis, being least exposed to irritation by decomposing secretions, etc., had evidently begun to retrogress, and its superficial erosion to epidermidize; those on the prepuce and at the root of the penis, where the conditions of warmth and retained secretions were most favorable to pus infection, were deeply ulcerated and advancing. The dates of the appearance of all the lesions may not be absolutely accurate, but the patient is very positive of those of the first and the last ones, as well as of those of most of the others; and the terminal dates are of the most importance.

For here was an evident syphilitic infection, at the usual site and running the customary course, in which for thirty-nine days thereafter the patient remained susceptible to fresh inoculations, and got them. It is absolutely impossible that they could all have been gotten at one and the same time and from the same virus with such great differences in the time of primary incubation. They may have been acquired at different times from one or several sources; the time of incubation, skin susceptibility, and apparent health being sufficiently long for that purpose. This I consider to be their explanation; since auto-infection could only occur after the first chancre was an open sore, and the time between this occurrence and the appearance of even the last labial chancre was too short for the usual incubation of the initial lesion.

The practical interest of the case rests in the fact that for a period of from four or five weeks after the implantation of the specific virus in his skin, the patient did not suffer from a general infection so as to be insusceptible to a fresh inoculation. Ablation of the prepuce with the sclerosis would not, in this case, have prevented the general infection, since the virus had already been implanted in other foci. But if, as is usually the case, the first had been the only lesion, it seems quite possible that excision of the chancre, even if done days after the appearance of the primary sore, might have prevented the systemic poisoning. I have met with a number of similar cases, though I can point to one only in which there appears to be indubitable evidence, so far as our means of obtaining it years ago was possible, in which I have aborted a syphilis by the early and radical ablation of the initial lesion. The case emphasizes, however, the statements that I have made elsewhere, and which I would reiterate: That there is a period of time, though we do not know its extent, during which the syphilitic virus remains localized; that removal of the infective focus during that time may prevent the systemic spread of the disease; that the disrepute of this

operation, based on the trials of experimenters thirty years ago, when both our means of early diagnosis and of non-infective operation were far less perfect than they are today, is possibly unmerited; and that the excision of the chancre, in suitable cases seen reasonable early, is a therapeutic or rather a prophylactic measure that deserves a retrial.

Nerve Syphilis from the Practitioners' Viewpoint. In a recent article¹ I have endeavored to assemble in concise form the diagnostic features that will enable a non-specialist to recognize the unfortunately common and very important effects of the the treponema invasion on the nerve structures. Diagnosticated in their early stages, these affections are usually amenable to appropriate treatment and of good prognosis; unrecognized or improperly handled, the permanent sclerotic changes finally occur which are entirely beyond the reach of our therapeutic efforts.

At least 10 per cent., neurologists tell us, of all the diseases of the nervous system are due directly or remotely to syphilis; and nervous symptoms of some kind occur in many infected cases with sufficient frequency to make them part of the regular symptomatology of the specific infection. The multiform and often complex effects of the virus on the nervous structures are matter that concern the neurologist rather than the general practitioner; but he should know something about those of commoner occurrence; and more especially he should be able to differentiate them from similar symptoms due to other and non-specific causes.

Injury to the nerve structures occurs both in the early and in the later stages of the specific disease; due either to the direct effects of the spirochete invasion on the bloodvessels supplying them, or on the nervous elements themselves, or to the action of the toxins by the microbes, or, finally, to the secondary and terminal results of the inflammatory action that they set up. It is not necessary for our present purpose to differentiate between these. Some note was made in the last issue of this review² as to the relationships of paresis, tabes, and the psychoses to the specific infection; to which the following general considerations may be added.

Fournier found that, in a series of 3249 cases of tertiary syphilis, there occurred 1093 instances (32 per cent.) of various lesions of the nervous system. Dejerine claims that over two-thirds of all cases of paraplegia are due to lues; and, according to v. Graefe, over 50 per cent. of all eye-muscle paralyses are due to the same cause. Taken in conjunction with the acknowledged fact that practically all instances of tabes and paresis are to be ascribed to the same disease, the tremendous etiological role of syphilis in diseases of the nervous system is apparent.

¹ Post-Graduate, April, 1912.

² PROGRESSIVE MEDICINE, September, 1912, p. 131.

In the earlier stages of the infection, the nerve structures suffer from the direct effects of the microbic invasion through its action on the vessels; in the later ones, chronic endarteritis and chronic hyperplastic inflammation plays a more important role; and, in the very last stages, the sclerotic tissue changes resulting from the pathological processes account for the symptoms, though even as late in the infection as this the most recent investigations seem to show the presence of the specific organisms themselves in the nerve tissues. It is quite possible that this location of the spirochetæ in the nerve elements themselves may partly account for the usual failure of treatment; though undoubtedly the permanent sclerotic changes caused by the long standing inflammatory processes that the organisms have occasioned in the bloodvessels take part in occasioning their recalcitrancy. Any portion of the nervous system may be involved, so that an account of the symptomatology of syphilis of the nervous system would include a sketch picture of all the commoner and some of the rarer neurological conditions. And this involvement may happen at any time during the course of the disease, from the time of its earliest spread through the system to its latest stages; for so far as we know the term of life of the spirochete in the tissues is an indefinite one, and may last for many years. Cerebral hyperemia, irritation and inflammation of the meninges and of the cortex, irritation or inflammation of special nerves or groups of nerves; endarteritis and endophlebitis, with all their after-effects; diffuse gummatous infiltration or gummatous tumor formation in the membranes or in the brain substance; with similar affections of the ganglia and of the peripheral nerves; all these may give us symptom-complexes of the most varied character. Cephalalgia, insomnia, somnolence, anesthesia, pain, spasm, paralyses of different kinds, epileptiform or apoplectiform attacks, psychic disturbances, etc., may appear or may alternate one with another. The picture thus formed is with difficulty decipherable by any but the trained neurologist. Fortunately for us, however, syphilitic affections of the nervous system have certain general characteristics that differentiate them to some extent from similar affections not due to the virus.

Certain areas and localities of the nerve tissues are especially prone to be affected by the luetic poison. A knowledge of these facts will help us to come to a conclusion as to the nature of the affection with which we have to deal; as will also any evidences of the presence or past presence of luetic disease. Actual symptoms of syphilis are, of course, proof presumptive that the nervous troubles are due to that cause, though naturally, in a disease so extremely chronic, other affections may occur independently. A history of past syphilis is of less value, though it should always have weight in our consideration of the etiology. And here a few words as to the *value of the serum test* in deciding the diagnosis will not be out of place.

I have taken occasion elsewhere to criticise the undue weight accorded to the Wassermann test as evidence of the specific nature of a given lesion, calling attention to the admitted facts that when it is positive it means only that the individual has been infected at some time in his life, but not necessarily that the lesion under consideration is of syphilitic origin; and that when it is negative it is evidence of a very much weaker and less decisive character as to the absence of syphilis and of correspondingly less importance in determining the diagnosis. In syphilis of the nervous system, however, circumstances give the test an importance that it does not possess in other fields. When we recollect the acknowledged tendency of the specific virus to attack the nervous structures, the great similarity of the symptoms in affections of the nervous system due to syphilis and those due to other agencies, the comparative hopelessness of our therapeutics in non-specific nervous diseases, and the general innocuousness of antiluetic medication even if unsuccessful; it will very evidently be an error on the safe side to lay special stress on the Wassermann reaction as a factor in making the diagnosis and determining the treatment. Its role in this class of syphilitic effects and sequelæ is similar to that which it plays in newgrowths that may be either of malignant or of specific origin. The alternatives from diagnostic and therapeutic points of view are so generally unsatisfactory, the possible benefits to the patient are so great, and the disadvantageous effects of a mistake are so small, that we are justified in attaching special importance to the reaction, and instituting vigorous antiluetic treatment of serious nervous diseases in every case in which the serum test gives us the slightest indication for its use.

Looking at the symptoms of nerve syphilis from a general viewpoint, the following considerations may help the practitioner to come to a conclusion:

1. The brain affections of early syphilis are most frequent in the first year after infection, and next most frequent in the second year; 50 per cent. of all cases occur in the first three years; it is most commonly a specific endarteritis, and next most often a syphilitic meningitis with specific infiltration of the cranial nerves; gumma is the least frequent. The cephalalgia that almost invariably marks the early secondary stage of the disease is regarded as due to hyperemia or distinct inflammation of the meninges.

2. The paralyses of early brain syphilis, with the exception of those of the cranial nerves, are oftenest due to thrombosis from arteritis; hemorrhage or gumma being rarer. In the very earliest stages, the effects of treatment may be brilliant; but, when fully developed, the lesions are not more amenable to treatment than are similar changes due to arteriosclerosis or atheroma.

3. Lack of type is a marked symptom of early brain syphilis, so

that any case presenting an odd mixture of somatic and psychic symptoms, or a bizarre appearance or disappearance of them, is suspicious. Insomnia, somnolence, or alternations of them; pain or anesthesia; spasm, paralysis, or both; monoplegia, paraplegia, hemiplegia, crossed paralysis, single or multiple cranial nerve paralyses, give a hodge-podge of symptoms and partial manifestations.

4. Headache is present in 75 per cent. of the cases; its locality is unimportant; it is usually nocturnal, but it may be vesperal, or even markedly diurnal.

5. Sudden attacks of various kinds are common, and their transient appearance is characteristic. Every sort of fit, from the mildest to the most tumultuous, occurs. There may be dizziness, syncope, momentary unconsciousness simulating petit mal, localized numbness or tingling, spasms, or apoplectiform or epileptiform convulsions.

6. Cranial nerve paralyses are frequent and striking phenomena in early brain syphilis, the eye nerves being most frequently affected; the immense majority of ocular paralyses are syphilitic. A typical change in the visual field, sudden blindness without changes in the fundus, paresthesiæ or pains in the distribution of the fifth nerve, tinnitus, dizziness, and aural vertigo, with the well-known affections of the third nerve, are common signs of the disease.

7. Progression of the disease by fits and starts, as successive vascular twigs are involved, is a common feature of early brain syphilis.

8. A peculiar stupor or partial stupor is frequent, and is a fairly characteristic symptom, especially when occurring in combination with some of the other symptoms mentioned.

9. The spinal cord and the peripheral nerves are much less liable to be affected than the brain in early syphilis.

10. Late syphilis of the nerve structures occurs only exceptionally during the first three years of the disease; it usually appears later, and may not show itself until twenty or forty years *post infectum*.

11. It is usually due to gummatous infiltration of the neural and perineural structures, or to the presence of gummatous tumors, or, finally, to the sclerotic end results of chronic syphilitic inflammatory processes.

12. The symptoms are the classical ones of changes due to degeneration of or pressure on the nerve structures; paralyses, anesthasias, sensory changes, pain, or the signs of tabes or paresis.

13. Only in the early stages, and more especially when the symptoms are largely secondary to gummatous infiltration or tumor formation, is late nerve syphilis amenable to treatment. When sclerotic or degenerative changes have occurred, the damage done to the nerve structures is usually irreparable.

14. If, in addition to the nerve system symptoms having the above features, there is other evidence of syphilis, past or present, the pre-

sumption of the luetic nature of the lesion is strengthened, and a most vigorous antisyphilitic treatment should be instituted. And even if the evidence as to lues is insufficient, proper medication will do no harm, and should be tried.

Syphilis without a Chancre. Under the designation of "syphilis d'emblée," a number of cases have been recorded during the last twenty years in which indubitable syphilis is said to have occurred without the appearance of an initial lesion. In connection with an apparent case of his own, Almkvist¹ has recently subjected the entire matter to critical consideration; and he comes to the conclusion that only four of all the recorded cases can really be considered proved. These rest on the authorities of Jullien, Waelsch, and Bettmann, and they all occurred in physicians who infected themselves by pricking or cutting their fingers during an operation. The facts that the sites of inoculation were accessible to continuous observation, that a direct solution of continuity had occurred, and that authoritative syphilographers record them, apparently place these observations beyond dispute. No single undoubted case is on record in which infection occurred in the ordinary way, without a gross solution of continuity, and in which there was no initial lesion.

Besides this, the literature contains records of 23 cases, some of them by well-known syphilographers, in which syphilis acquired in the usual manner is said to have been unprecedented by a chancre. Almkvist finds that not one of these is indubitable; in most of them, indeed, it is probable from the records that a hidden chancre was present. In his own case, the history of which is recited at length, a man infected with both gonorrhea and syphilis was under daily medical observation for his protracted gonorrhea alone, and some three months (eighty-five days) after the infecting intercourse showed a maculopapular, general eruption. A most careful examination by inspection and palpation failed to reveal an initial lesion anywhere in his body; but the urethral secretion was found to contain typical spirochete, and in the urethra behind the fossa navicularis there was a sharply-limited, easily bleeding erosion of the mucosa. This was undoubtedly the initial lesion, though it was not palpably indurated; it must have been present for some time, but was masked by the abundant gonorrheal discharge. The manner in which the infection occurred is doubtful. It is difficult to understand the occurrence of a lesion of the tissues at a site so protected from external injury. We have no evidence that the spirochete attack the intact mucous membrane. Possibly the spirochete remained living in the urethral canal for some days, and then the advancing gonorrheal infection afforded them an entrance into the tissues.

The fact remains that, if Almkvist had not examined the urethral secretion for the treponema, the case might have been recorded as a

¹ *Dermatologische Wochenschrift*, February 15, 1913, p. 190.

typical instance of syphilis without a chancre, more especially as it was and had been for a long time under daily and careful medical examination. Many of the recorded cases of syphilis d'emblée were accompanied by a gonorrheal discharge, and it is probable that, in most of them, there was a urethral chancre. Just as the treponemas gained access to the interior of the urethra in this case, it is supposable that they could enter the cervical canal in the female; and here the initial lesion would be practically undiscoverable. Even demonstration by the microscope would be very difficult, on account of the comparative abundance of the cervical secretion and the many contaminations to which it is subject.

I have long been of the opinion myself that syphilis without an initial lesion merely means syphilis with one which we have been unable to discover. The recorded cases form but an insignificant fraction of those met with in everyday practice, in which there is apparently no sclerosis. The experience of every syphilographer coincides with my own, that cases of undoubted active syphilis are referred to us with the statement of the attending physician that no chancre has been found. Tonsillar chancre has often occurred, and I have known such to be ablated by competent laryngologists, under the impression that a simple hypertrophy was present, and the diagnosis only made when the secondary eruption appeared. The facts that the chancre is often a very insignificant lesion, that it is painless, and that it retrogresses spontaneously, must account for its being overlooked at times, especially in careless individuals, and when located in the parts less exposed to observation. A chancre of the rectum, of the cervical canal, or of the deeper parts of the mouth, may well escape observation or be misinterpreted; and if the treponemas can obtain access to the cervical canal and the tonsil, I know no reason why, in exceptional cases, they should not get to the interior of the uterus or the retropharynx or esophagus. I am even inclined to go a little farther than Almkvist, and to doubt even the four cases of syphilis d'emblée which he considers proved. It is possible that even in them there may have been a chancre located elsewhere in some cases, and the infection may not have been from the operation wound. With an evident chancre the invariable rule in millions of cases, with the few exceptions open to more than serious doubt, we should be careful in accepting an isolated exception or two, and should rather ascribe its apparent occurrence to fault in examination or in the patient himself.

Variola and the Pustular Syphilide. The general pustular syphiloderm is a rather rare manifestation of secondary syphilis; it is more frequent in the colored races than in whites, and is sometimes difficult to differentiate from smallpox, especially during an epidemic outbreak of the latter disease. During such an epidemic in New York, a number of

years ago, a number of cases of syphilis, especially among negroes, were sent to the contagious disease hospital under the impression that they were cases of smallpox. The sudden outbreak of a general papular eruption, rapidly becoming pustular, the temperature which may reach 103 degrees or more, the pains in the limbs and back, etc., form a symptom-complex which, in the presence of an epidemic of variola, may well simulate that disease. Careful examination, however, should prevent mistake. The lesions of smallpox are all of one age, papular,



FIG. 31.—Pustular syphiloderm simulating variola. (Kirby-Smith's case.)

pustular, or umbilicated; in syphilis lesions in all stages, from the small beginning papule to the large pustule are present at one and the same time. The papules of variola are harder and more shot-like than those of syphilis; and the pustules all soon show the characteristic umbilication. The face and backs of the hands are involved to a much less extent in the venereal than in the variolic infection. The fever in syphilis is more or less persistent; in variola there is usually a marked remission after the eruption appears. Finally, in a luetic case, some

other evidences of active secondary syphilis will certainly be present; the initial lesion or its remains, the local and general adenopathy, the angina, night pains, etc., and a serological examination will clinch the diagnosis.

That these data, however, will not always suffice to remove doubt is shown by a case lately recorded by Kirby-Smith.¹ It occurred in a light-colored negress, and the eruption was discovered during the compulsory vaccination during an epidemic of variola. Smallpox was at once suspected; and the case was regarded as such. Observation soon showed, however, that the small pustular eruption was persistent, and did not undergo the normal evolutionary changes of variola; that lesions in all stages of development were present, and new papules were constantly appearing; that the face was almost free; and that the patient had a general adenopathy, mucous patches in the mouth, a characteristic pharyngitis and moderate osteocopic pains. The diagnosis of syphilis was later confirmed by the serological examination and by the development of a bilateral iritis, and the prompt result on the symptoms from a salvarsan injection. I append the picture of Kirby-Smith's case (Fig. 31).

¹ Journal of the American Medical Association, November 9, 1912, p. 961.

OBSTETRICS

BY EDWARD P. DAVIS, M.D.

PREGNANCY

The Diagnosis of Pregnancy. This familiar topic does not lose its practical interest, and has gained new scientific scope through recent discoveries.

The practical importance of the subject to the patient and physician, and the difficulties surrounding diagnosis, may well be described in the following recent experience of the reviewer.

A young woman, a weaver, worked at a loom which required active movement of the lower extremities and of the right arm and shoulder. After an indefinite time she developed symptoms of soreness in the right lower abdomen. A gradual increase in the abdominal circumference was noticed, without special pain or tenderness, and with the continuance of menstruation. She consulted a general practitioner who, although she was unmarried and of good reputation, considered her probably pregnant, and called a consultant, who agreed in the suspicion. She then went to a woman physician, who made the same diagnosis, and upbraided her for immorality.

As she was the only support of an aged and infirm mother, devotedly religious and highly esteemed by her acquaintances, she was excessively shocked and depressed by the verdict which she knew must be a mistake.

When brought for examination, the abdomen was the size of a six months' gestation. The thyroid gland was not enlarged, there were no changes in the breasts, and palpation revealed a solid and cystic tumor, with the solid portion upon the right side of the abdomen. The rapid beating of the patient's abdominal aorta might easily have been mistaken for fetal heart sounds, as her pulse was considerably above 100 on examination.

By vaginal examination the cervix was unaltered, the body of the uterus could be made out not enlarged and anteverted. The right half of the pelvic cavity gave the resistance of a cystic tumor.

Before operation the patient requested that the physician who had seen her most frequently, and who had been most positive in the diagnosis of pregnancy, should be invited to be present. Her wish was complied with.

Upon opening the abdomen, there was no sign of pregnancy. The

solid and cystic tumor of the right ovary filled the right lower half of the abdomen and extended upward behind the intestine. It contained several quarts of a chocolate-colored fluid and a considerable mass of dark semisolid substance. A small portion of its capsule was adherent to the floor of the pelvis. Its removal was followed by the removal of the appendix, which had become adherent to the broad ligament near the tumor. An uninterrupted recovery followed.

In this case a rapidly beating abdominal aorta was mistaken for fetal heart sounds, and pregnancy was insisted upon, although the patient's reputation and practically her life would have been blasted, had not the truth become known.

It is undoubtedly true that the possibility of pregnancy cannot be denied on examining patients whom one does not know and who are in the child-bearing period; but this possibility should remain unexpressed by the physician, and no hasty diagnosis of pregnancy should be made in unmarried women without positive evidence. Sometimes the truth, if pregnancy be present, can be withheld from the patient for a short time, until a relative can be consulted, who can come to her rescue and give her the care which is necessary.

In attempting a diagnosis of pregnancy, mistakes usually occur because the examiner does not proceed in a regular and definite order in his examination. While the history given by the patient may be worthless, as, if she be vicious she will try to deceive, still the time which she occupies in giving this history may be utilized in observing her. No opinion should be offered without the opportunity for a thorough examination. The truth of this statement is illustrated by a case recently admitted to the wards of the Maternity Department of the Jefferson Hospital. A young unmarried girl, aged nineteen years, had been under treatment for several weeks, by competent medical men, for gastritis. Her symptoms were persistent nausea and vomiting, with arrested digestion, and obstinate constipation. Her mother asserted positively that pregnancy could not be present, and no pelvic examination was made. She was finally sent to the hospital as a medical case, and the diagnosis made by the examining resident physician.

Upon vaginal examination, a typical intra-uterine, early pregnancy, was present; but the patient's condition of pernicious nausea had become so pronounced that it was necessary to terminate the pregnancy. The discharge of the embryo left no doubt concerning the diagnosis.

In this case, had a pelvic examination been made early, it might have been possible to continue the pregnancy.

In examining cases where pregnancy, if present, is early, the patient's history will usually suggest disturbance of digestion. Sometimes the suspension of menstruation is definitely described, and in other cases only irregularity. In examining such a patient, the face should first be

inspected and the condition of the pupils noted, as they often show the undue excitability from which pregnant patients usually suffer. Many women in early pregnancy are pale and anemic; a few are plethoric. The thyroid gland should invariably be examined, as this is frequently enlarged in early gestation.

Proceeding to the thorax, the changes in the breasts are of great value in the diagnosis of early first pregnancy. Discoloration is in proportion to the patient's complexion, and may be almost absent in albinos or very light blondes; but the breasts are altered in consistence, and follicles invariably appear about the base of the nipple. It is rare that altered sensation and even slight pain is absent. The presence or absence of fluid is not of special value, as this may be found in various conditions—the result of nervous excitement or disturbance of the glandular system. Very rarely the lymphatics of the axillæ show change.

Upon auscultation, the action of the heart is disturbed and is usually more rapid than normal.

Upon examining the abdomen, epigastric tenderness is not uncommon and ovarian tenderness is not infrequent. There is often more gas than normal in the intestine, and it may be difficult to make out the body of the uterus. In sensitive, nervous patients the recti muscles are firmly contracted.

A vaginal examination is positively necessary in the diagnosis of early pregnancy, and an opinion should be withheld if such examination is not permitted. The results of a specular examination are not of sufficient importance to make it indispensable.

The trite caution of making vaginal examinations in the presence of a reliable third person is still timely and in difficult and disputed cases such a precaution is indispensable. It is well to have the patient empty the urinary bladder before examination, and if the case is a doubtful one, and this is not spontaneously accomplished, the catheter should be used. In most patients the dorsal position is best, but in some, when the pelvic floor is very resisting, and the patient highly nervous, the left lateral posture is useful.

The examination should be bimanual, for where the external hand may appreciate nothing more than the presence of the fundus, it should depress the uterus sufficiently to enable the fingers of the internal hand to make out the lower uterine segment.

Vaginal examination discloses the altered condition of the cervix, the unusual pulsation of the bloodvessels in the vaginal and pelvic tissues, the position of the cervix, and of primary importance, the presence or absence of the lower uterine segment. Upon this may depend the recognition of pregnancy.

To obtain this, two fingers should be carried along the posterior vaginal wall of the cervix and upon its anterior aspect. The fingers

should be pushed upward along the cervix until the vaginal tissue is carried slightly upward upon the fingers. The external hand should then depress the uterus over the pubis, and combined manipulation should enable the fingers of the internal hand to pass into the groove or sulcus which denotes the presence of the lower uterine segment. Above this the fundus, more or less enlarged, should be made out.

In some cases this diagnosis may be made by pressure upon the posterior wall of the uterus, although, in the experience of the reviewer, this is seldom necessary or satisfactory. One should avoid inserting the finger into the rectum for this examination, because the patient may become contaminated during manipulation, and the results are not so good as by the methods described.

The diagnosis of early pregnancy may be made if the lower uterine segment can be distinctly made out, as no other condition precisely simulates this.

The presence of the lower uterine segment should also be decisive in cases of abdominal section for hysterectomy performed in cases of multiple or soft myomatous tumors of the uterus. Some of these tumors precisely simulate the pregnant womb. The operator, after opening the abdomen and eventrating the tumor, may still be in doubt whether it is a fibroid or a pregnant uterus. If he can recognize the lower uterine segment, as he would readily do with the abdomen opened if it were present, the uterus should not be opened. If this cannot be made out, the uterus should be incised, when the case will be found to be not that of pregnancy. Those who operate for the removal of fibroid uteri will find this a reliable test. In form, shape, color, and consistence, the symmetrical uterus, enlarged by fibroid disease, may exactly simulate the pregnant womb.

Vaginal examination having been completed, other points still remain from which useful knowledge may be obtained. Most patients in early pregnancy have abnormal and variable pulse tension. The examination of the blood in early pregnancy shows moderate leukocytosis, not sufficient to suggest infection, and yet an abnormality. Deficient hemoglobin and red cells are often observed. The examination of the urine rarely fails to reveal disturbed metabolism. There is usually evidence that nitrogen is being stored in the maternal organism through diminished excretion of urea. If the patient is starving, through nervous excitement or disturbed metabolism, the ammonia coefficient will be increased. If she be toxic, the urea will be lessened, ammonia increased, indican present, and often urates in excess. Casts of various sorts are frequently found and sometimes blood corpuscles. The reaction will be faintly acid or alkaline, and mucus may be present in considerable quantity.

The effort has been made to consider some of the *constituents of the urine* as present only in pregnancy and as specific signs of gestation.

Thus, Novak and Porges¹ considered *acetonuria as a sign of pregnancy*, normal or extra-uterine; but when one remembers in how many conditions acetone will be present, it is evident that no one chemical element can be considered a positive sign in the urine of pregnant patients.

Of late, attention has been directed to what has been termed the biological diagnosis of pregnancy through the examination of the blood. The study of the ferments of the blood and the various specific toxins produced during pregnancy, has in general been directed to ferments formed in the placental substance, and expressing somewhat the relation of the mother's organism to the growing embryo.

Abderhalden,² in a monograph, publishes the results of his studies as to the *method by which the animal body protects itself against foreign bodies*. He finds that the reaction is metabolic in character and that ferments are found as the result of this action in the blood plasma. Substances taken into the body as food are variously altered by ferments in the cells of the different digestive glands. The human blood plasma does not normally have digestive action on proteins, and substances introduced into the digestive tract requiring digestion do not normally enter the blood.

The investigator sought to determine whether foreign bodies not passing through the digestive organs, but brought directly into the blood, result in the development by digestive power or fermentative action upon the blood plasma. Experiments show that various protein substances in the blood of rabbits and dogs develop digestive properties in the blood plasma. Carbohydrates and fats do not. Among other means, the polariscope showed the difference between mixtures made with normal serum and mixtures of material from the digestive tract, with serum from the blood of animals into which protein matter had been injected.

Confirming the experiments of Weineland, it was found that the injection of sugars into the blood was followed by metabolic action of the blood serum. In the fats, the results have not yet been clearly determined.

Abderhalden and Heilner consider these processes attacking foreign substances in the blood plasma as protective in nature. In pneumonia, Dick³ found that a pneumococcus is digested by a ferment in the blood serum. Abderhalden considered the ovum and its appendages as in some respects a foreign body in the maternal organism, and discovered that, during pregnancy, albuminoid matter derived from the placenta is digested by ferments in the mother's blood. Before the formation of the placenta, the villi of the chorion constantly enter

¹ Berliner klin. Wochenschrift, November 25, 1912.

² Schutz. fermente des tierischen Organismus, Julius Springer, Berlin, 1912.

³ Journal of Infectious Diseases, 1912, No. 10, p. 384.

the blood of the mother, and the cells of these villi are digested by ferments developed in the blood plasma. These ferments seem to be specific as regards chorionic villi, and later the placenta. They were found in the first month, disappearing eight days after abortion, or labor at term. Extract of placenta injected into male animals caused the formation of these ferments in the blood plasma, and the placental tissue was digested in the blood.

Proceeding with this study, Abderhalden¹ modified his method somewhat, to bring it within the limits of practical application.

The principle is that of simple color tests. Placental tissue prepared and carefully kept, is subjected to the digestive action in small quantities of several cubic centimeters of fresh blood serum from the patient to be examined. Dialysis in a suitable tube is the method employed. If the enzyme marking the reaction of the patient's blood against the placenta has formed, it will specifically attack the protein material of the placental extract, but no other. The results of this action can be obtained by a test for albuminoids in the products of the diffusion. The test is not especially difficult, and is quite within the range of the clinical laboratory.

In the *Deutsch. med. Woch.*, November 14, 1912, No. 46, Abderhalden again writes upon the subject. He uses both the method by dialysis and also the polariscope. By the latter, blood serum with placental peptone rotates the plane of polarized light in opposite directions in the serum from pregnant and non-pregnant patients. This is confirmed in animals other than human.

In his most recent investigations, he uses dialysis by mixing the placental tissue with blood serum in a dialyzing tube hung in a beaker or jar with 20 c.c. of distilled water. This is incubated for sixteen hours, and 10 c.c. of the material which dialyzes is put in a test-tube and examined for protein. A definite clear reaction proves that the placental tissue has been attacked by the blood serum.

To form an opinion as to whether the embryo or fetus is living or not, if a positive result is given by the test, but there is a history of recent hemorrhage from the womb, the patient has probably aborted. This reaction as pregnancy advances is less definite, but after the birth of the child grows more pronounced.

Studies in the human being and in animals indicate that the blood of the mother and the offspring are independent so far as biological relations go.

In the *Berl. klin. Woch.*, September 2, 1912, Frank and Heimann report 33 cases studied by this method, with positive results. But one or two periods had been suppressed and vaginal examination gave no clear result. In 21 patients, opportunity was given to examine them

¹ Weiterer Beitrag zur biologischen Feststellung der Schwangerschaft, *Ztschr. f. physiol. Chem.*, 1912, Band lxxxi, p. 90.

subsequently when the anatomical signs of pregnancy could be made out. Among these were 6 patients who had amenorrhea with negative serum reaction, and who were afterward proved not to be pregnant. In the puerperal period, whether the mother had given birth to a child at term, or had aborted, the reaction was present in the first week, but after the thirteenth day it was absent.

An interesting test of the method was afforded by a case with symptoms of ectopic gestation, with positive serum reaction. On section, both tubes were inflamed but no evidence of the presence of an embryo could be found. When the patient's history was carefully taken, it was found that an abortion had occurred just before admission to hospital. A similar experience is reported in another case. This would indicate that the decision to operate must not be based on this test alone.

The difficulty in the practical application of the test lies in the manipulation necessary for successful dialysis.

An interesting contribution upon this subject is made by Veit¹ in the clinic at Halle.

Veit divides the signs of pregnancy into three categories: First, those which are positive; the recognition of the fetal parts; hearing of the movements of the child; the feeling of the child's movements and the hearing of fetal heart sounds. These all originate in the fetus.

In a second class are the probable signs of pregnancy. These comprise alterations in the sexual organs and in the breasts. Such are found only in women, but sometimes in women who are not pregnant.

In a third class are the results of pregnancy upon organs other than the reproductive organs, and the subjective signs. These may even be found in the male subject.

Because the elements which make this test possible proceed from the placenta and not from the embryo or fetus itself, Veit is not disposed to include this evidence as among the positive signs of pregnancy. He describes three interesting cases, as follows:

First, disordered menstruation, painful tumor at the side of the uterus, evidence of gonorrhea absent, and the serum test positive.

On section, a tubal abortion was found, and upon examining the decomposed embryo, living and dead villi of the chorion were present.

In a second case the uterus was enlarged, there was uterine hemorrhage, and the retention of the placenta was suspected. The serum test was positive. The uterus was dilated, and a placenta of four months removed. Nothing was seen of the fetus.

On microscopic examination, the villi of the chorion were still living.

In a third case of tubal pregnancy, the embryo had died in the tube, and the reaction test was positive. In two cases there was negative

¹ Zeitschrift f. Geb. und Gynäkologie, 1912, Band lxxii, Heft 2.

reaction. One patient had hemorrhage after abortion, the uterus remaining slightly enlarged. Upon dilatation, a placental polyp was found which, upon microscopic examination, showed mitosis in Langhans' layer of cells and in the syncytium, without coagulation. In a second case, placental tissue in small quantities was retained.

Of these cases, Veit is inclined to doubt the accuracy of the method for the diagnosis of normal pregnancy. He raises the question whether, by this method, one could distinguish between the presence of a living fetus or a dead ovum. This method may also help us to ascertain whether a living placenta still remains within the uterus.

Veit also describes the case of a patient having an enlarged uterus which was apparently in early pregnancy. On abdominal section, the external appearance of the womb indicated pregnancy, but, on incision, a fibroid tumor was found. The serum reaction had been negative. In tumors of the adnexa, the method will be found valuable in differentiating ectopic pregnancy from salpingitis or from ovarian tumors. In chorio-epithelioma, the serum diagnosis should be valuable.

The difficulty in applying the method lies in the fact that it is somewhat complicated, and requires apparatus and experience, which physicians do not ordinarily possess. While this method is of great interest to obstetricians, and may prove of practical value, it should be a most important addition to physiological knowledge.

Benthin¹ has made studies with the extract of hypophysis, commonly known as *pituitrin*, to determine its value in the *differential diagnosis between pregnancy and labor*. He finds that, during pregnancy, pituitrin promptly produces a result in stimulating uterine contractions. In the irregular and painful contractions of pregnancy when labor is absent, pituitrin seems to lessen such contractions, and when these pains have died away it is impossible to again excite them by giving this remedy. On the other hand, if a patient is actually in labor, small doses produce a prompt response. The reflex abdominal pressure through the action of the abdominal muscles in labor is increased by pituitrin.

Kolde² has studied the *hypophysis in pregnant and non-pregnant animals* to discover the alterations which occur following pregnancy. The gland increases in size during gestation by the multiplication of its cells, whose protoplasm becomes more distinct. This change is repeated in each succeeding pregnancy, and is observed in rabbits and guinea-pigs, as well as in the human subject. The gland also enlarges after castration, but in this instance it is the eosinophile cells which are increased. This is true in rabbits and probably in the human subject. There seems to be a correlation between the reproductive organs and the hypophysis, shown by the increase in the principal

¹ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxx, Heft

² Archiv f. Gynäkologie, 1912, Band xeviii, Heft 3.

cells in the hypophysis during gestation. This is also demonstrated by the change in the eosinophile cells.

The Pernicious Nausea of Pregnancy. THE METABOLISM OF PREGNANCY. Clinically, the most interesting complication of pregnancy, and perhaps the most frequent, is the disturbance commonly known as pernicious nausea.

A distinction must be made between vomiting and nausea in these cases. It is almost invariably relieved by drinking water freely, and ejecting from the stomach highly acid mucus. If a stimulant, such as tea or coffee, be taken, the disturbance usually subsides. Should vomiting occur at irregular intervals during the day, it can often be traced to hyperesthesia, and the disturbing elements can frequently be recognized. Some patients escape this disagreeable symptom by taking precautions to have their meals with the least possible disturbance and discomfort, and others do well by an entire change of scene, which removes previous suggestion. It is often followed by great improvement in appetite. Medication, for vomiting only in pregnancy, is unnecessary and often harmful, as it may mask symptoms of a graver condition.

Constant and pernicious nausea in gestation is of much more serious import. This may vary from a period lasting for a few hours only to the pernicious nausea which persists during the patient's waking hours. With this is prostration in greater or less degree, and starvation gradually develops. Unless care be taken to recognize essential changes in the body, the patient may easily pass into a condition of hopeless depression and toxemia.

In dealing with these cases, it is first essential to obtain an accurate history, for in no other way can one distinguish between vomiting and pernicious nausea. Where it is difficult to get accurate data, it may be necessary to put the patient in charge of a nurse until the exact situation becomes clear. The history of such a case is often misleading, as the patient may intentionally deceive by exaggerating the symptoms, with the hope of persuading her physician to induce abortion.

Pernicious nausea may be divided, in accordance with our present knowledge, into three classes of cases:

The first class comprises those which depend largely upon reflex nervous irritation, originating in the genital organs, caused by some dislocation or alteration in structure. A frequent malposition of the uterus is retroversion, illustrated by Sperling's¹ recent report. His patient was a primipara who aborted spontaneously at the third month, following nausea, with retroversion of the uterus. Shortly after, she had a severe hemorrhage for which curetting was done. Upon getting up from this, she again had nausea, when it was found that the uterus was subinvolted and retroverted. Repeated curetting,

¹ Zentralblatt f. Gynäkologie, 1913, No. 2.

with replacement of the uterus, and feeding by rectum for several days, finally resulted in a cure. Here malposition of the uterus and the subinvolution present seemed to be the exciting cause of the nausea.

In these cases, fatal septic infection may develop unless a diagnosis is promptly made, the bladder emptied and disinfected, and the uterus replaced.

In dealing with the irritable condition often found in the uterus during pregnancy, iodine or argyrol will usually be the most efficient remedies. Depletion may safely be secured by glycerin tampons.

The second class of cases of nausea are those in which nervous depression and reflex excitability were brought about by a condition of starvation. Some of these patients are illegitimately pregnant, and to others who may be married, pregnancy is unwelcome. A continued nervous depression causes profound neurasthenia with inability to take food, and starvation results.

These cases may be mistaken for the most deadly form of nausea if a diagnosis is based upon urinary findings only. It has repeatedly been shown that, in starvation cases, the ammonia coefficient may be high in the urine, and hence the possibility of error. In these cases, when the urine may be altered, the blood shows no important changes, there is no coffee-ground vomit, no great substernal pain, the pulse may be rapid, but its tension is not much altered, the functions of digestion are sluggishly performed, and the patient is susceptible to treatment by suggestion and appropriate mental influence. When once the current of thought is changed, such patients will usually take food in increasing quantities.

The reviewer has just had under his care a very interesting case of this variety of nausea. The patient, a young girl, was illegitimately pregnant, and, under a mistaken diagnosis of gastritis, had been treated for that disorder for some weeks. When a direct diagnosis was made, starvation was so threatening that the uterus was emptied. Although the urine was scanty and loaded with debris, there was no evidence of extensive changes in the kidneys, there was no coffee-ground vomit or substernal pain, and the condition of the circulation was relatively good.

It was noticeable that, after the production of therapeutic abortion, the patient improved very greatly and in direct proportion to the improvement in her nervous condition. Vomiting continued after the abortion, until the patient could assimilate sufficient food to give strength to the nervous system. At no time in the case was the prognosis grave, so far as life was concerned, although it was not deemed wise to attempt to prolong the pregnancy.

In the third class of cases, the nausea resulted from acute and fulminant toxemia. To account for this, several theories have been advanced, notably that of alteration in the blood of the mother resulting

from the disintegration of villi of the chorion which have been carried into the blood current. The lesions found post mortem in these cases indicate that a profoundly altered condition of the blood is the essential pathological entity present, and it seems rational to believe that chorionic villi acting as foreign bodies may be the cause of the condition.

So greatly is the liver altered anatomically in these cases that some have been disposed to ascribe the condition to altered hepatic structure and functions. Others, noting the frequency of degenerative changes in the kidneys, consider those organs as most important.

Whatever may be our theories as to the causation of pernicious nausea, the majority of observers agree upon the essential points in diagnosis and treatment.

Distinguishing between vomiting and pernicious nausea, we estimate the severity of the latter by the degree of prostration present and the condition of the blood. The more apathetic the patient, the more severely ill she is. In proportion to the severity of the case, the blood shows evidence of profound disintegration, and undoubtedly future study will indicate, by the biochemical examination of the blood serum, what is the essential cause of the hemic changes. Resulting from the alterations in the blood, the secretions and excretions are profoundly altered, the nitrogenous excreta being split up into various abnormal compounds. The heart and bloodvessels are considerably altered, and the pulse and heart action proportionately disturbed.

Death occurs in these cases from multiple thrombosis and embolism, and not infrequently from pulmonary gangrene with minute areas of hemorrhage.

As our study of the blood advances, we obtain from this useful hints in the treatment of pernicious nausea. If the villi of the chorion are foreign bodies producing a characteristic ferment, it may be possible to add to the patient's resisting power by injecting the serum of a healthy woman to reinforce that of the diseased individual. Such efforts have been in some cases partly successful. It would not seem that placental extract would be indicated in these cases, as this would act as a body to be resisted and would increase the patient's burden. Where serum therapy is impossible, one may still hope to influence the character of the blood plasma by introducing salt solution into the circulation, and by giving the patient such albuminoid substances as are most easily assimilated.

At present, we know of no efficient way of altering or checking the degenerative changes in the liver in cases of pernicious nausea. As this is secondary to the altered blood state, we should be successful in preventing the development and extension of these changes in proportion as we can influence the character of the blood.

Our present knowledge of pernicious nausea shows the inability of

drugs to be of essential value in treatment. The development of specific medication by sera and the success of salvarsan in treating infectious blood diseases, give hope that pernicious nausea may be successfully combated in future by these or similar methods.

At present, in pernicious nausea an accurate diagnosis is of special importance, followed by the use of those measures which promote elimination in the simplest way and supply nutrition. Should the condition of the blood fail to improve under these measures, and the patient's strength fail perceptibly, the interruption of pregnancy becomes imperative.

In proportion as pregnant women seek medical advice early, and follow faithfully the precautions indicated by the medical adviser, pernicious nausea will grow still less frequent, as in septic infection prevention is far more successful than cure.

In the *Journal of Obstetrics and Gynecology of the British Empire*, November, 1912, Williams publishes a paper read before the Glasgow Obstetric and Gynecological Society, upon the subject of pernicious vomiting. He still holds to the classification of reflex, neurotic, and toxemic vomiting. He does not attempt to distinguish between vomiting and pernicious nausea. He recognizes the imperfect reaction on the part of the mother to the growing ovum as an underlying factor, usually only a predisposing cause. When to this is added a neurotic or reflex influence, pernicious vomiting occurs.

He now does not consider the high ammonia coefficient as specific, as this may be a manifestation of toxemic vomiting, starvation, or acidosis. When it is an important symptom, the recognition of the type of disease present in each case must be made by a careful clinical observation. When there is no lesion of the genital organs to produce a reflex disturbance, a low ammonia coefficient indicates neurotic vomiting, which can be cured by suggestion and dietetic treatment.

Failure of the patient to improve under treatment calls for the prompt production of abortion—in primiparous women by vaginal hysterotomy. Ether or nitrous oxide gas should be used as an anesthetic.

In dealing with pernicious nausea, the reviewer would call attention to the fact that it is practically impossible to empty the pregnant uterus at one sitting. These patients should not be subjected to prolonged anesthesia, and as severe and even fatal hemorrhage sometimes occurs, the wounding of the endometrium by the curette may be a dangerous factor. Under anesthesia, the cervix should be dilated sufficiently to admit a No. 41 or No. 43 solid dilator. A blunt curette may then be passed gently over the uterine surface, when frequently no evidence of the ovum will be found. The uterus should then be tightly packed with 10 per cent. iodoform gauze. The continuous instillation of salt solution by rectum is useful after this procedure, and, if the uterus does not expel the gauze, it may be removed in forty-eight hours.

Usually the ovum, or part of it, will be removed with the gauze. Should hemorrhage occur, the uterus should again be packed. Frequently the appendages of the ovum are never recognized in these cases, as they undergo rapid disintegration and are discharged with blood clots.

The metabolism of pregnancy is a subject which has occasioned minute study and intense interest, resulting in a mass of observations from which it is difficult to draw definite conclusions.

The metabolism of nitrogen and its compounds has received special attention because of its supposed relation to pernicious nausea and eclampsia.

Murlin¹ gives his results in investigations made in the physiological laboratory of Cornell University Medical College, New York, upon the *protein metabolism of normal pregnancy*. He studied minutely three cases of normal pregnancy, followed by a normal puerperal period, and found that the distribution of the nitrogen and sulphur fractions of the urine were very nearly the same before and after labor. Independently of the nitrogen of the food, the total urinary nitrogen increased suddenly about the sixth or seventh day after delivery. Evidently by autolysis the products of involution in the urine were changed to urea before excretion. Before labor there is an increase in the ammonia nitrogen, and nitrogen is retained before labor, as shown by the fact that the urea plus ammonia nitrogen, is loaded in percentage of total nitrogen before parturition. Experiments in animals confirm this observation that the nitrogen retained for the growth of the fetus is potentially urea or ammonia nitrogen. The creatinin nitrogen is higher before delivery, the urea nitrogen after delivery. In healthy women, the urine gave no indication of hepatic insufficiency in late pregnancy. The lack of carbohydrates in the food before labor may produce creatin in the urine. The metabolism of involution accounts for the presence of this substance in the urine after delivery. There is evidence that sulphur, as well as nitrogen, is retained in the body of the mother for the development of the fetus.

Among the French, considerable study has been given to the *relation existing between the corpus luteum and the pernicious nausea of early gestation*.

Chirie² obtained the uterus and ovaries from a woman dying from pernicious nausea. He found, in the ovaries, cystic degeneration, and changes in the corpus luteum, which led him to infer the causal relationship between them and the patient's fatal disease.

That the toxic *disturbance of pregnancy* may be successfully treated by serum is illustrated by Freund.³ He had the case of a multipara

¹ Surgery, Gynecology, and Obstetrics, January, 1913.

² Archiv mensuelle d'Obstétrique, April, 1912.

³ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxx, Heft 2.

delivered at eight months of twins, who developed, after labor, a multiform toxic exanthem. As this proved resistant to other methods of treatment, he injected 25 c.c. of fresh serum into the left cubital vein. There was a sharp reaction, with chill and fever for half a day, followed by almost all disappearance of itching. In two weeks the patient had entirely recovered.

That characteristic *changes in the liver* are inevitable in pregnancy has long been believed.

Heinrichsdorff,¹ while recognizing the central fatty disintegration of the lobules of the liver, as present in pregnancy, does not believe that they have the same causal relation to pernicious nausea which acute yellow atrophy has to eclampsia. This condition is five times more frequent in pregnancy than in the non-pregnant, and he is not willing to ascribe it to engorgement or to congestion of the liver alone. The anemia from which pregnant patients suffer seems to be a more rational cause of this condition, and this results in lessening the quantity of iron usually present in the liver.

Bergsma² has studied the digestion of sugar by the liver during pregnancy. He does not find that in normal pregnancy this is disturbed, nor that the functional power of the liver seems to be altered. The alimentary glycosuria frequently seen in pregnancy he does not ascribe to the liver, but to hyperfunction in the epithelia of the liver.

Heynemann³ has studied minutely the functions of the liver in the formation of creatinin. He shares the skepticism of other authors who do not believe that the liver in the healthy pregnant patient is materially altered or disturbed in its functions during pregnancy.

Landsberg,⁴ in studying the *digestion of nitrogen, phosphorus, and sulphur during pregnancy*, finds that this is undoubtedly different in the pregnant than in the non-pregnant patient. It is impossible to compare pregnancy with any physiological or pathological condition. These variations he does not ascribe to pathological conditions in various organs, but to adaptation on the part of the organism to the condition of pregnancy. His researches would indicate that so long as the patient remained in good condition, variations in metabolism were to be considered as normal in each individual case.

Benthin⁵ explains the presence of *sugar in the blood during pregnancy, labor, the puerperal period*, and in cases of eclampsia by the disintegration of muscle substance through varying degrees of muscular contraction.

An interesting study upon the *retention of nitrogen in the organism in patients upon a milk diet* is contributed from Bar's clinic in Paris,

¹ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxx, Heft 2.

² Ibid., Band lxxii, Heft 1.

³ Ibid., Band lxxi, Heft 1-2.

⁴ Ibid., Band lxxi, Heft 1-2.

⁵ Ibid., Band lxxi, Heft 3.

by Lemeland.¹ He placed a number of pregnant patients upon an exclusively milk diet, and studied the elimination of nitrogen. His observations showed the retention of nitrogen in the mother's organism during the last months of pregnancy, and not in the form of urea, as the urea diminished under the milk diet.

Under this diet, the nitrogen was retained as fixed nitrogen in the mother's organism, and was undoubtedly consumed in the development of the fetus. The purin bodies were diminished in the urine, the amount of urea diminished in the blood, and the patient's metabolism was markedly improved in so short a time as the first four days following the use of the milk diet.

Franz² has investigated the *toxicity of the urine during pregnancy*. He would classify as poisonous those urines which, when injected into the peritoneal cavity of guinea-pigs, caused shock. The urine from healthy patients is no more poisonous than from those not pregnant. Labor produces increased toxicity, and this is true of abortion, whether from the uterus or Fallopian tube. After labor and abortion, the urine becomes less toxic. In cases of pregnancy complicated by urticaria, the urine was found highly toxic, and this was also the case in eclamptic patients.

In pregnancy complicated by severe nephritis, the toxicity of the urine was lessened, or even entirely destroyed. In pernicious nausea there was evidence of acute toxemia.

There is abundant evidence that *alterations in the circulation of pregnant women* are frequently produced by abnormal metabolism.

Judd³ considered high blood pressure a symptom of danger, especially if serum albumin and serum globulin are present in the urine. Nucleo-albumin is less dangerous.

That altered conditions of the blood during pregnancy may produce hematuria, is illustrated by Treud.⁴

He reports 19 cases, and concludes from their study that the hematuria of pregnancy is essentially toxic in nature. It points to diminished kidney function or to the beginning of serious changes in the kidney.

Dienst,⁵ by experimental studies, has come to the conclusion that fibrogen and fibrin ferment have much to do with the changes in the kidneys in pregnancy and with the ultimate development of eclampsia. By injecting fibrin ferment into pregnant animals, he produced degenerative changes in the liver and kidneys, essentially those found in the toxemia of pregnancy and in eclampsia. A notable increase in leukocytes was present.

¹ Archiv mensuelle d'Obstétrique, May, 1912.

² Archiv f. Gynäkologie, 1912, Band xevi, Heft 2.

³ American Journal of Obstetrics, March, 1912.

⁴ Monatsschrift f. Geburtshülfe und Gynäkologie, Band xxxvi; Proceedings of Sixth International Congress, 1912.

⁵ Zentralblatt f. Gynäkologie, 1912, No. 21.

Schneider¹ was able to isolate from the blood of pregnant, parturient, and puerperal women, and also from the blood of the umbilical cord, substances causing contraction of bloodvessels, which he thought were not present under normal conditions, but developed from fibrinogen or cellular debris, occasioned by the onset of labor or other pathological conditions occurring in pregnancy.

Polak² discusses the indications for operation in the toxemia of pregnancy, and the choice of operation. In pernicious nausea before the placenta is formed, he would practise curetting; after the placenta has developed, anterior hysterotomy. He believes that when eclampsia is threatened and medical treatment fails, the uterus is best emptied by surgical methods. In the presence of convulsions and coma, prompt delivery is indicated by that method which seems most appropriate in the condition of the cervix which is present. If no effacement has occurred, anterior hysterotomy is to be chosen rather than dilatation.

Eclampsia Treated by Intralumbar Injections of Normal Pregnancy Serum.—Mayer³ reports, from Sellheim's clinic in Tübingen, the case of a patient admitted in severe eclampsia, comatose, with edema of the lungs and threatened heart failure.

The intralumbar injection of normal pregnancy serum was made without effect. Autopsy showed extensive changes in the liver.

The child of a mother having mild eclampsia was taken soon after birth with severe eclamptic convulsions. The child's condition grew rapidly critical, and 5 c.c. of normal pregnancy serum was injected into the lumbar sac. Immediate and remarkable improvement followed, which persisted for a time, but finally terminated in relapse, and in death. While an isolated instance is of little value in forming a definite opinion, it may serve as a suggestion.

Stange⁴ reports two cases of eclampsia, one severe and one mild, treated by the injection of serum from the placenta by Abderhalden's method of dialysis. It was found that the eclamptic placenta acted much more vigorously than does the normal placenta.

Normal Pregnancy Serum in the Treatment of Pernicious Nausea. Rubeska⁵ reports two cases of pernicious nausea in which he gave a thorough trial to the serum as a means of checking the nausea. No effect could be detected from the agent, and it was necessary to interrupt the pregnancy in both cases.

Disease of the Thyroid Gland Complicating Pregnancy. We now recognize the clinical fact that pregnancy is usually attended by alteration in the thyroid gland. From our study of the non-pregnant, we recognize two principal types of thyroid alteration: That which is attended by deficient development of the thyroid, with hypothyroidism,

¹ Archiv f. Gynäkologie, 1912, Band xevi, Heft 1.

² Surgery, Gynecology, and Obstetrics, August, 1912.

³ Zentralblatt f. Gynäkologie, 1913, No. 9.

⁴ Ibid.

⁵ Ibid.

and that which is characterized by excessive activity of the thyroid, or hyperthyroidism.

The first in extreme cases produces myxedema and cretinism; and the second is familiarly seen in goitre.

It is the rule, and not the exception, that the thyroid is enlarged in early pregnancy. A similar enlargement is often seen in young girls at the development of menstruation. In pregnancy, this increase in size constitutes a sign and symptom of pregnancy, which should not be neglected in making a diagnosis.

Hypothyroidism is a not infrequent accompaniment of sterility, especially in women in whom marriage is followed by considerable increase in weight, without conception. In these cases the administration of thyroid extract with a nitrogenous diet, and often the addition of tonic doses of strychnine, will be followed by conception.

In normal pregnancy, the thyroid enlargement is never excessive and ceases to be prominent as gestation advances.

In abnormal pregnancy, hypothyroidism, through deficient formation of the gland, or degeneration in the gland substance with increase in size, or the accumulation of colloid material, may be an important factor in toxemia.

The diagnosis of thyroid toxemia is made by observing the enlargement and cystic condition of the gland, the tendency to exophthalmos, with disturbance of the pulse, and disturbance in the nitrogenous metabolism. Nausea is sometimes pronounced in these cases, and, should the patient go to labor, the onset of uterine contractions is followed by great distention of the thyroid, with pressure on the trachea, and difficult respiration which may threaten suffocation.

Pregnancy complicated by hyperthyroidism is not often seen. It is characterized by disturbance of the pulse, extreme nervousness, and a tendency to convulsions.

In pregnancy complicated by hypothyroidism and thyroid toxemia, the patient can often be brought through her pregnancy to term by a carefully selected diet and by the administration of thyroid extract. If there is a history of difficult labor, with threatened suffocation in former parturition, delivery must be effected with the least possible delay and shock to the patient. The patient should not nurse her child, through fear of toxic poisoning, from an abnormal milk supply. She should receive proper care during recovery, and, after a reasonable time, if the thyroid still remains enlarged, surgical treatment should be instituted.

In the *American Journal of the Medical Sciences*, June, 1912, the reviewer publishes a paper read before the Alumni Association of the Lying-In Hospital of New York. After reviewing the recent literature, he reports four cases.

The first was a multipara who, during her first pregnancy, had

edema and sugar in the urine. She gave birth to a healthy male child, which she nursed thirteen months. In the second pregnancy, examination of the urine was negative, but the patient was unusually pale and highly nervous. Spontaneous labor developed rapidly, with great excitement, at about the eighth month. The child was born living and fairly nourished, the placenta containing infarcts along its edges. The secretion of milk was excessive, and the patient nursed the child, but remained in a highly neurotic and hysterical condition. The genital canal was relaxed, and retroversion developed. Ten months after the birth of the child the patient was in a wretched condition. Bilateral goitre, and exophthalmos of moderate degree, had developed. Her nervous and mental condition was greatly disturbed. Five months later, or about eighteen months after the birth of her child, she submitted to operation at the hands of another physician for prolapse of the vaginal wall. This was followed by unconsciousness and delirium, in which she died. No autopsy was obtained.

The second patient was slender and fairly nourished, her first pregnancy having terminated in a very difficult labor, during which vaginal deliver was at one time considered impossible. The pelvis was narrowed and flattened, the patient had nausea, exhaustion, and headache, the thyroid was slightly enlarged, and the nitrogenous metabolism deficient. With rest and thyroid extract she improved, the central lobe of the gland remaining as large as a small orange. She entered the Jefferson Hospital for labor, which was ushered in by a highly excitable and nervous condition. With her previous consent, she was immediately delivered by section. A living child was born without difficulty.

For the first twenty-four hours after operation she was exceedingly restless, and hardened feces and fecal sand were discharged from the bowel. The patient was able to nurse her child successfully for some time. Six months after delivery the thyroid had increased in size, and the patient was advised to wean her child, and submitted to surgical treatment. Thyroidectomy was performed by Dr. Gibbon, a portion of the capsule being left. The patient's recovery was uncomplicated. Eighteen months after the birth of the child the patient was in excellent health, slightly thinner, but able to resume her duties as a teacher, and free from fainting attacks which had previously annoyed her. Her child had done well.

The third case was that of a multipara whose family history gave enlarged thyroid in the parents and other members of the family. This was the patient's seventh pregnancy, the preceding ending in toxemia, abortion, and difficult labor, with no living child. In each pregnancy, the thyroid had enlarged greatly, and at labor the gland had become greatly distended and occasioned pressure symptoms.

When the patient came under observation, the thyroid was markedly enlarged, liver dulness extended a finger's breadth below the ribs, and

the abdomen was tympanitic. The ammonia nitrogen was 23.9 per cent., the uric acid and purin 1.2 per cent., creatinin and rest nitrogen 19.9 per cent. The patient was three months pregnant. She was put upon an essentially milk diet, with vegetables and bread, and thyroid extract in varying doses, and was told to come to Philadelphia for treatment at viability.

She did well until about two hundred and sixty-five days, when toxemia increased rapidly with edema of the lower extremities. She was at once delivered by section, and a well-developed male child, weighing 8 pounds 13 ounces, was born without difficulty. Anesthesia proceeded well, the patient's convalescence was complicated by great excitement for the first twenty-four hours after operation, and by subcutaneous infection in a portion of the wound. The mother did not nurse the child, and the child showed some symptoms of toxemia for several days. The mother did well after operation for three months, when the thyroid gland became larger, menstruation returned, and the patient's general condition became worse.

She was operated upon by Dr. Charles Mayo, the right lobe and isthmus of the thyroid being enucleated. It was found highly colloid and cystic. Following this the patient's general health improved.

The fourth case was that of a multipara who had lost her first child from toxemia, and who was treated during pregnancy by thyroid extract and a restricted diet. Labor was spontaneous, and the child was able to take the breast milk; but during lactation the mother suffered from attacks of toxemia which were relieved by calomel, thyroid extract, and hot baths. The child was weaned at seven months, and the mother's general health improved.

The essential phenomena in these cases are not different from other reported cases, but the employment of section as a means of delivery is not frequent, and was based upon the desire of the parents to save the child. The labor had been characterized by great excitement and dyspnea. The subsequent surgical treatment in two cases was notably successful.

Ward¹ publishes a paper read before the American Gynecological Society at its last meeting. He reviews the literature of the subject, and reports the subsequent history of a patient first delivered by vaginal hysterotomy, as she had Graves' disease, and severe toxemia complicating her pregnancy. The child lived but thirty-six hours.

In a second pregnancy, she was delivered again by vaginal Cesarean section. The child was born by version, and survives.

During both pregnancies she suffered severely with nausea and vomiting, accompanied by greatly diminished secretion of urine. Ward experienced such difficulties and complications in the vaginal operations performed upon this patient that he would choose elective

¹ Surgery, Gynecology, and Obstetrics, August, 1912

abdominal Cesarean section should this patient require delivery again.

He also reports a typical case of hyperthyroidism with Graves' disease benefited by the antiserum used by Beebe and Rogers. She passed through two pregnancies with considerable enlargement of the thyroid, but was delivered without serious interference. During pregnancy she was better than after the birth of the child.

He also reports two cases contributed by Beebe of Graves' disease treated by hypodermic injections of normal human thyreoglobulin, with success, the patient being delivered at term of a living child.

Ward divides his cases into two groups—the first having no Graves' disease, but without sufficient thyroid secretion, and the other having Graves' disease.

The first are benefited by thyroid substance in dry extract or serum. In the second group, it is essential to determine whether hyperthyroidism or hypothyroidism is present. If the former, rest, applications of ice, milk diet, and sedatives will benefit the patient, and, if necessary, the antiserum should be administered.

If hypothyroidism is present, thyroid substance should be given. The nitrogen partition of the urine is of service in estimating the severity of the toxemia, and abdominal Cesarean section in the presence of dystocia is the operation of choice.

Diseases of the Heart Complicating Pregnancy. Studies in the metabolism of pregnancy naturally lead to the consideration of the changes in the heart and vessels which altered metabolism invariably produce. Among pregnant patients we recognize mitral stenosis as a most dangerous lesion, and rheumatic infection often in childhood or adolescence, as the most usual cause. Aortic stenosis is less common and less dangerous, and mitral regurgitation less threatening. Minor lesions of the heart, with good assimilation, and youth, in the patient, do not forbid pregnancy. Under a suitable hygiene, compensation is maintained and labor is often uncomplicated. Where, however, the lesion is considerable, metabolism deficient, and the patient without proper care, heart lesions complicating pregnancy become exceedingly dangerous and often fatal.

The tolerance which pregnant patients sometimes exhibit to severe heart lesions is strikingly illustrated in a case recently under the charge of the reviewer. An ill-nourished woman, aged thirty years, having previously given birth to a healthy child, in her second pregnancy developed dyspnea and exhaustion. Her incessant cough led to a diagnosis of pulmonary tuberculosis. She persisted at her work until the eighth month, when she was unable to lie down to rest, and came under hospital care.

Upon examination she was breathing with difficulty, the pulse hardly perceptible at the wrist, and the heart sounds confused murmurs.

It was impossible to locate accurately the most important lesion, but evidently all of the valves were incompetent. The heart was much dilated. The urine showed granular casts and albumin, and liver dulness was increased. The child was living.

Under rest, milk diet, and digitalis, she improved for ten days, when the improvement ceased, and she began to fail. In accordance with her wish she was delivered under a minute quantity of ether diluted with oxygen, by rapid abdominal section, followed by hysterectomy. At operation, it was observed that the liver was greatly enlarged and cirrhotic.

The patient bore the operation well and improved for several days, the lungs becoming much clearer, but the heart ultimately dilated to a fatal issue.

A mistaken diagnosis of phthisis had been made from the pulmonary edema, occasioned by deficient circulation.

Labor often brings a patient pregnant, with heart disease, into imminent danger of death. Whatever form of delivery be selected, it must be as brief as possible, and the patient must have anesthesia. In the case in question, the time occupied by anesthesia was fifteen minutes, and under ether and oxygen the patient's heart action was better than before the operation.

In cases of severe heart lesion complicating pregnancy, the attending physician must hold himself in readiness to deliver the patient at any time should compensation fail, and, in the event of sudden maternal death, after viability, postmortem section is demanded.

A word of caution may be given in the treatment of these patients, lest salt solution be used too freely in the effort to stimulate failing excretion. The increase of fluid throws additional work upon the disabled heart, and some patients are more benefited by bleeding than by salt solution. Among heart tonics, the tincture of digitalis is best, and should this not be efficient, strophanthus may be cautiously given. Strychnine will not, as a rule, set up labor in these patients, but is useful as a general tonic, combined with atropine, if there be pulmonary edema.

The marked relief given by anesthesia, to a patient struggling in labor and apparently in danger of death, should lead to its prompt employment during parturition.

In the *Journal of the American Medical Association*, September 28, 1912, Newell contributes an interesting paper read before the section on Obstetrics and Gynecology of the American Medical Association.

His experience has shown that any organic heart lesion, although perfectly compensated, demands constant watchfulness during pregnancy. When pregnancy occurs where compensation previously failed, the uterus must be emptied. If compensation has been good before pregnancy, but pregnancy makes the patient worse, an attempt should

be made to restore compensation by rest and appropriate treatment, and, should this fail, pregnancy must end. Where compensation has failed during one pregnancy, future pregnancy should be forbidden. In the presence of organic heart lesion, although it has caused no symptoms, labor is dangerous. In such a patient, parturition should be shortened as much as possible and the heart relieved of straining. The reaction of the patient to operation will depend upon the presence of failure in compensation. Patients with organic heart lesions should be warned of the dangers of pregnancy and labor, and the prognosis in each case should depend upon the nature of the lesion, as regards compensation. When the cardiac muscle has failed at any time, although it may have been apparently restored, pregnancy may result fatally, as such a patient may die suddenly, before, during, or after labor, without warning. In primiparous patients, Cesarean section may be very properly considered in any case with demonstrable heart lesion, although no unfavorable symptoms may have arisen. Mitral stenosis is especially dangerous, and, if accompanied by a rise in arterial tension, calls for the termination of pregnancy.

Tuszka¹ contributes a paper from his experience in cases of heart lesion complicating pregnancy, at Marienbad. He describes six cases, and concludes that in pregnant women the pulse is normally less variable than in the non-pregnant, indicating a normal hypertrophy of the heart during gestation. In cases where heart lesion was present before pregnancy occurred, the prognosis was usually unfavorable, the pulse becoming greatly disturbed, and indicating failure of compensation. In other cases the heart lesion had been unsuspected until pregnancy occurred. Among these are cases of angiosclerosis, or patients with hereditary goitre, or those in whom the heart had been weakened by influenza, typhus, gonorrhea, tuberculosis, syphilis, or rheumatism. The heart lesion develops gradually in these patients, and the prognosis is not invariably bad.

The Condition of the Blood in Pregnancy and Hematuria in Pregnancy. The majority of those who have studied the etiology of toxemia and eclampsia find in the blood the most positive evidence of disturbed metabolism. The condition of the blood cells gives knowledge concerning the essential character of the blood itself.

Doi,² from Veit's clinic in Halle, has studied the blood cells in pregnancy with special reference to their behavior in toxemia. He finds that, in pregnant and puerperal patients, the erythrocytes are diminished in number; the leukocytes are increased, especially in first pregnancies. During labor, the leukocytes increase as labor advances. During the first twenty-four hours of the puerperal period they are reduced

¹ American Journal of Obstetrics, November, 1912.

² Archiv f. Gynäkologie, 1912, Band xcviii, Heft 1.

one-half, and in the fifth week of the puerperal period become normal. The increase in leukocytes is accompanied by a corresponding growth of neutrophile cells. The eosinophile cells and mast cells diminish during pregnancy, and disappear during labor, increasing during the puerperal period. The neutrophile blood picture is extended toward the left of the scale in pregnancy, is more marked during labor, and still more in cases with kidney complications and eclampsia. In the puerperal period, and with the disappearance of albuminuria, it returns to the normal. Blood plates increase these leukocytes.

In pregnancy and the puerperal period, one often finds blood cells with nuclei, microcytes, and macrocytes. These disappear during the puerperal period. This phenomenon is more frequent in cases complicated by albuminuria, and greatly in evidence in eclampsia. In infectious diseases these changes in the blood seem to depend upon the violence of the infection.

There is an interesting analogy between the blood changes in pregnancy and those observed in the acute infectious diseases. The blood condition also is seen in cases of thrombosis. The blood plates are essentially cells, and have an important bearing in the resistance of the patient to toxins. It is doubtful whether the changes in the leukocytes, without changes in the blood cells, indicate the tendency to thrombosis. Blood changes occurring during labor probably depend upon the increase in toxins following intense muscular activity.

Abderhalden's recent researches indicate that in the study of the blood cells, one need have no reference to albuminous bodies developed in the blood serum.

The alteration in the blood described in the previous paragraphs explain readily the occurrence of hematuria in pregnancy. This symptom may be inexplicable if the existence of pregnancy is overlooked, and while ureteral examinations may localize the hemorrhage from one kidney, and local treatment be applied to the pelvis of the kidney, the condition will not cease while pregnancy remains. In some cases varicose vessels in the urinary bladder, not complicated by the presence of hydramnios, may rupture, causing hemorrhage.

Colarni¹ reports such a case. The patient was pregnant with twins, one of whom had omphalocele and meningocele. He also reports a case of nephritis terminating in eclampsia, in which hematuria was a well-marked symptom.

Treub² reports 19 cases of hematuria complicating pregnancy.

It is interesting in these cases to note the varying causation of the hemorrhage. In some, nephritis was present; in some, hemorrhagic pyelitis; in others, cystitis; in one, a stone in the pelvis of the kidney

¹ Monatsschrift f. Geburtshilfe und Gynäkologie, 1912, Band xxxv, Heft 5.

² Ibid., Festneumer, Band xxxvi.

was suspected, and, in others, toxemia. All showed that pregnancy predisposes to hematuria; while Guyon's interesting case is quoted in which, three months after labor, hematuria returned, persisting at intervals until five months after labor, when the child was taken from the breast. After this, the hematuria ceased.

Treub believes that auto-intoxication in pregnancy, accompanied by passive or active hyperemia is the essential cause of hematuria, in some cases being accompanied by alterations in the kidneys, and in others, by temporary engorgement only.

Bacillus Coli Communis Infection during Pregnancy: Pyelitis, Appendicitis, and Perityphlitis. Our experience now teaches us to recognize a group of lesions complicating pregnancy as essentially the result of infection by the *Bacillus coli communis*. Appendicitis has long been known as a not uncommon complication of gestation. Pyelitis is a well-recognized condition, and the surgical study of these cases leads the reviewer to believe that both appendicitis and pyelitis in pregnancy are often present at the same time in the same patient, and from a common cause, the *Bacillus coli communis*. Upon anatomical grounds, the explanation of this condition is readily afforded. The interference with the functions of the intestine and the right ureter by the growing uterus, the possibility of ascending infection from the urethra to the bladder, and thence through the ureter to the right kidney, and the existence of infection of the blood stream, all serve to explain the condition.

These cases are most often seen in ill-nourished women with habitual constipation, bad nutrition, and bad excretion. In the experience of the reviewer, most cases develop from the sixth to the eighth month, when the size of the uterus is sufficient to occasion considerable pressure. The symptoms are pain in the right side of the lower dorsal region, with vague pain in the right abdomen. Very rarely can the enlarged right kidney be palpated, as it is usually pushed upward by the fundus of the uterus. There may be tenderness over the appendix, or this may be absent, but there is considerable tympany. The patient's temperature and pulse disturbance vary with the severity of the infection. In pronounced cases there are chills, high temperature, and frequent pulse; the urine is acid, with abundant leukocytes, and swarms with *Bacillus coli communis*; the fecal matter is hardened and fecal sand is often discharged.

The prognosis in these cases depends upon the resisting power of the patient and the severity of the infection. All cases demand immediate rest in bed, purgation, lavage of the intestine with hot salt solution, and a rigid milk diet.

Drugs are of no special value except to purge, and calomel, followed by saline, is most efficient. In favorable cases a few weeks suffice for the patient's convalescence, and, with good hygiene, pregnancy goes

on successfully. With an ill-nourished, depressed patient, and a severe infection, the danger of surgical kidney, with peritonitis, must be considered when surgical treatment is indicated.

The recent experience of the reviewer illustrates the preceding. An ill-nourished Italian woman was admitted to the Maternity Department of the Jefferson Hospital complaining persistently and vigorously of severe pain in the right lower dorsal region. Palpation over the normal position of the right kidney elicited severe pain, but palpation just above the usual kidney site seemed to cause greater suffering. There was moderate distention of the abdomen, with obscure tenderness in the right side. The patient was obstinately constipated. Free purgation with calomel and saline, rest in bed, and milk diet, reduced the temperature from 104° to 103°. The pulse still remained high. Little relief from pain followed this treatment, and the temperature rose again. The appendix was then removed and found acutely inflamed at the tip, adherent, and with subacute peritonitis in the right lower abdomen. Incision over the usual position of the right kidney showed that the kidney had been pushed upward beneath the rib. It was surrounded by subacute inflammation. With difficulty it was brought down into the wound. The posterior surface of the large bowel was exposed as the tissues were adherent, and the peritoneal cavity, during manipulation, was opened. This was immediately closed by suture. The kidney was greatly enlarged, dark, purplish red, and was anchored in the wound by catgut stitches passed through the capsule. It was incised upon the convex surface, and the gloved finger passed through the kidney substance to the pelvis. A copious flow of dark blood, smelling strongly of urine, followed. The kidney wound was packed with iodoform gauze to check bleeding and for drainage. Following the operation the patient had great distention, relieved by enemas, but was able to take food and stimulants by the mouth. The quantity of urine excreted steadily increased, and drainage through the wound was considerable.

At the moment of writing, the patient's convalescence is not sufficiently advanced to give a prognosis. Labor has not occurred, and she seems to be slowly improving.

In this case, the urine was swarming with *Bacillus coli communis*, and the abundant discharge from the kidney, with evidences of infection in the kidney wound, leaves little doubt but that the case was one of unusually severe *Bacillus coli communis* infection.

The reviewer has treated successfully two similar cases by incision and drainage, and, in the presence of well-pronounced pyelitis in pregnancy which does not yield to rest in bed and milk diet, he believes that operation offers the best result. In the two cases previously operated upon, pregnancy was uninterrupted, and the mothers and children did well.

In the *British Medical Journal*, April 13, 1912, Crew reports the case of a multipara five months pregnant who had a retroverted uterus which was replaced under anesthesia. Two weeks afterward she was suddenly seized with severe abdominal pain and vomiting, and complained of great pain in the right loin and iliac fossa, where there was well-marked tenderness.

Shortly after examination the patient had a chill, with a temperature of 106° followed by profuse sweating, the temperature falling to 97°. The urine was acid, without albumin, blood, or pus. As she was not better on the next day, it was thought that she had appendicitis; as pus was absent from the urine, and as she grew no better, with a very rapid pulse, the abdomen was opened.

The ascending colon was distended, but there was no peritonitis, and the appendix was healthy. The gall-bladder and pelvic organs were normal but the right kidney was greatly distended. Apparently nothing was done to the kidney, and the abdomen was closed. Abortion followed on the next day, with twins, and the urine was then found to contain pus and *Bacillus coli communis* in pure culture. On the day following delivery, the patient collapsed and required active stimulation, with which she gradually rallied. Pyuria persisted for three weeks, with final recovery. Urotropin was used, and peptonized milk was given as food.

In the light of the reviewer's experience, it is interesting to consider whether the patient would not have done better if the kidney had been drained following the opening of the abdomen.

Andrews¹ has collected 19 cases treated in the wards of the London hospital. The average age was twenty-six years; 8 were primigravidæ, 9 multiparæ. The disease usually occurred about the sixth month, and, in 6 cases, constipation had been a prominent symptom. In 8 patients, the right kidney was involved; in 8, both kidneys; and in 1, the left kidney alone. One patient gave a history of a similar attack in a former pregnancy. Fever had been absent in 2 cases, in 14 was as high as 102° F., and in 6 it reached 104° F. When there were chills, the temperature reached 105° or 106°.

The urine was acid in 18 cases, and alkaline in 1. In 13 cases, bacteriological examination of the urine was made, the *Bacillus coli communis* being found in 7, a coliform bacillus in 5, and the *Streptococcus albus* and a diphtheroid bacillus in 1. The symptoms were pain in the loins, pain and tenderness along one or both ureters, sometimes pain from micturition, with sleeplessness and malaise.

Spontaneous abortion at five months occurred in one case, both kidneys being affected through the *Bacillus coli communis*. The left kidney was explored four days before abortion, the patient dying the day following abortion. Autopsy showed pyelonephritis on the right

¹ *British Medical Journal*, May 18, 1912.

side and pyonephrosis on the left, the kidney being converted into a large abscess. In one patient, premature labor was induced at seven and one-half months. The patient recovered, but the child lived but a few hours.

In 17 cases, rest in bed, milk diet, urotropin, potassium citrate, sodium phosphate, and, in a few cases, vaccines, comprised the treatment employed.

He also reports the case of a patient who, ten days after normal labor, had fever without evidence of disease of the pelvic organs, or cystitis, and with apparently normal urine. The patient seemed well enough to get up, but after exposure to cold, chills, fever, sweating, and abdominal pain developed. A normal appendix was removed without benefit, and a deposit of pus was found in the urine. The patient received medicinal treatment for pyelonephritis, and recovered.

He also reports the case of a patient who, six days after the induction of labor, had chills and fever, with great frequency of micturition. There was no evidence of infection of the genital tract, but the urine contained pus. The temperature rose to 106°, and exploration of the uterus revealed nothing in its cavity but a small, inoffensive clot. Tenderness developed in the right kidney, with *Bacillus coli communis* in the urine. The patient gradually recovered.

Schichele¹ reports the results of his study on this subject in Fehling's clinic in Strassburg.

By the use of the x-ray, he was able, especially in non-pregnant patients, to demonstrate the fact that much of the pain from which patients complained in this disease was caused by pressure and dilatation in the pelvis of the kidney and in the ureter; with some, torsion or kinking of the ureter was present. In many non-pregnant patients, the urine was sterile, without special quantities of leukocytes and epithelium. In these cases, rest in bed and irrigation of the pelvis of the kidney through the ureteral catheter, were indicated.

When bacilli were found in the urine, collargol solution was injected, with good results.

In pregnancy and the puerperal period, pain in the pelvis of the kidney is also sometimes present without pyelitis or the presence of bacteria. Pyelitis, however, is often present from the very beginning of the pain. If, however, the pressure is relieved, the pain usually ceases. The presence of bacteria alone is not sufficient for a diagnosis of pyelitis, but an accumulation of urine, with pressure, must also be present.

As regards the causation of the infection, ascending infection with the *Bacillus coli communis* during pregnancy is not uncommon. The altered position of the bladder during pregnancy, and pressure upon the base of the bladder, accounts for the interference of drainage from

¹ Archiv f. Gynäkologie, 1912, Band xcvi, Heft 2.

the ureters. Previous infection is also undoubtedly present in cases of pyelitis developing during or immediately after labor. In addition to the presence of bacteria in the uterine secretion, in the blood, and in the urine, the sudden development of this condition and the sudden disappearance of symptoms point to a free discharge of bacteria.

Unquestionably many cases result from the ascent of the *Bacillus coli communis* from the colon to the pelvis of the right kidney through the lymphatics. With these patients constipation is an important element, and a bacteriuria and pyuria are often present. Interference with peristalsis and the movement of the contents of the bowel must often cause such infection.

This paper is accompanied by *x*-ray pictures of the enlarged right kidney, some of which are indistinct.

Godecka¹ has studied 19 patients, of whom 13 were treated for symptoms of appendicitis when not in the pregnant condition, to observe the influence of pregnancy upon appendicitis. In 16 pregnant patients who previously had appendicitis, 5 had no symptoms of a second attack; 11 grew worse as soon as pregnancy began, with symptoms of chronic appendicitis.

The disturbance of old adhesions by the growing uterus was thought to be the cause of this phenomenon. These symptoms usually appeared about the third month, when the uterus begins to rise into the abdomen.

A differential diagnosis must be made between ovarian tumor with twisted pedicle, cholecystitis, intestinal occlusion, pyelonephritis, and ureteritis, and occasionally ectopic gestation.

In making a diagnosis, it is often useful to place the patient with the pelvis greatly elevated, and then to make an examination through the vagina and through the rectum. Care must be taken not to cause pain during examination, and this may make it impossible to employ some methods of diagnosis. McBurney's point and Rovsing's sign are not typical in appendicitis complicating pregnancy, because of the altered anatomical condition of the abdomen.

In but 9 of these cases did pregnancy run a normal course, and, among these, 2 were operated upon at the third and fourth month of gestation. In both patients there were dense adhesions in the appendix, and the posterior uterine wall. In 10 patients, or about 50 per cent., pregnancy ended prematurely.

This experience indicates that, in cases of chronic appendicitis lighted up by pregnancy, the removal of the appendix is indicated to prevent the interruption of gestation.

Three cases of acute appendicitis were seen in the second and third months of gestation. All were operated upon, and two aborted. When hemorrhage from the uterus occurred, with fever and lack of typical

¹ Zentralblatt f. Gynäkologie, 1912, No. 15.

signs of peritonitis, the differential diagnosis between appendicitis and septic abortion was difficult.

The writer quotes such a case in which hemorrhage occurred from the pregnant uterus between the second and third months. On the second day, distention of the abdomen occurred; on the third day, ileus. Section revealed an abscess beneath the navel, and a second abscess on the right side. Both were drained, and three days later an abscess formed in Douglas' cul-de-sac, which was drained through the rectum after dilating the sphincter. The patient made a tedious recovery.

Acute appendicitis is more violent the further advanced is the pregnancy. All authorities agree regarding the necessity for operation and opening abscesses in appendicitis complicating pregnancy. It is useless to induce labor or to empty the uterus as it has no effect upon the progress of the appendicitis.

Lichtenstein¹ reports the case of a multipara whose pregnancy had proceeded at first without disturbance. The patient was taken with pain near term, and the midwife diagnosticated a transverse position; she endeavored to perform external version, and made local applications. The patient grew no better, the fever increased, and a physician was called who diagnosticated appendicitis. He treated the patient expectantly for two days, when he sent her to the hospital.

Upon admission the temperature was high, and the pulse rapid and very weak. The patient complained of abdominal pain, malaise, and cutting sensations in the abdomen, without vomiting. Respiration was frequent, the tongue was dry, and there was slight cyanosis. The abdomen was distended; there was pain on pressure in the right epigastrium, with dulness. The fundus of the uterus reached above the umbilicus, the uterus was closed, and there was no evidence of pelvic involvement.

Section was made by an incision parallel to Poupart's ligament. The abdominal wall was edematous and discolored, and, upon opening the abdomen, a small quantity of fluid and odorless pus escaped, containing staphylococci and spores. The omentum was adherent and discolored.

As the patient's condition was critical, no effort was made to find the appendix, a gauze drain was introduced, and salt solution and stimulants were given. An abundant discharge of pus occurred from the wound, and the patient came into labor, giving birth to a living child in breech presentation. As the placenta was not expelled in three hours after labor, it was manually removed, and an ice-bag placed over the abdomen. The patient's symptoms increased, and death followed.

¹ Zentralblatt f. Gynäkologie, 1912, No. 34.

Upon section, there was diffuse, acute peritonitis. The appendix was bound down in Douglas' cul-de-sac and showed two perforations.

When the uterus was examined, the internal surface showed evidence of inflammation on the right side, posteriorly, and externally.

The serous covering of the uterus was greatly thickened, and the uterus had evidently been a portion of the wall of an abscess.

This case illustrates the danger of allowing appendicitis to develop into perityphlitis during pregnancy. Should labor or abortion occur, uterine contractions rupture the adhesions which have been formed as a guard. The uterus almost invariably, in these cases, forms a considerable portion of the wall of the abscess, and hence the danger of rupture when the uterus contracts.

Bacteria in the Genital Tract, and the Influence of Vaginal Douching. Amersbach¹ remarks upon the power shown by staphylococci to penetrate to various portions of the body. He examined 40 normal pregnant patients to determine the presence of staphylococci in the vagina. Bacteriological examination showed cocci present after 81 tests; 48 per cent. of these cultures showed hemolytic power, and the toxins were identified as those of genuine pus-forming staphylococci. The puerperal period remained undisturbed by these germs.

In *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1912, Band lxx, Heft 1, Esch and Schroeder conducted bacteriological examinations to determine the results of *vaginal douching during pregnancy*. The effort was made to determine whether the endogenous germs found in the vagina during pregnancy can be lessened in quantity by vaginal douching. In general, the results of the treatment seemed favorable. In many cases no result whatever could be observed.

If one decides to use douches in the treatment of labor, one should be given in the beginning, then immediately before and not after the vaginal examinations, and before operative procedures. This should prevent inoculation with bacteria already present in the genital tract, and is successful in proportion to the abundance of the bacteria present before labor. It is useless to give douches after an examination, as bacteria already inoculated in the vagina will not be removed by douching.

In most clinics, douches are used before vaginal operations, but not, as a rule, before examinations.

In cases of prolonged labor, douches were given with very little pressure, and very carefully, every ten hours, and apparently with good results. Sterile salt solution, and a solution or emulsion of cresol soap, were the fluids employed.

The Bacteriology of the Vagina. In the *Zentralblatt f. Gynäkologie*, 1913, No. 7, Traugott and Goldstrom utilized 902 patients for the examination of the vaginal secretion before labor. These patients were admitted to hospital without fever. While some of them had

¹ *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1912, Band lxx, Heft 2.

been examined before admission, and, in some cases, efforts at delivery had been made, still these patients presented no clinical symptoms of infection. Vaginal examination was omitted in these cases, and rectal examination was employed. The temperature was carefully taken for nine days after labor, and the highest limit for normal temperature was taken at 38° C.

In the 902 cases there were 839 spontaneous births, and, among them, 42 cases of narrow pelvis. In 40 cases of breech presentation, manual assistance was necessary. In 23 cases, there was some vaginal operation.

He found, among the spontaneous labors, that 12.3 per cent. had a rise of temperature during the puerperal period, but without the presence of streptococci. In cases where breech presentation and manual delivery had taken place, although streptococci were absent, there was fever in the puerperal period in 6.25 per cent., and where operation had been performed through the vagina, the same result had followed in 30 per cent., although in none of these cases were streptococci present.

In 311 cases anhemolytic streptococci were found, and, of these, 10 per cent. had fever, although labor was spontaneous. When breech presentation was present, 8.33 per cent. had fever, and, in vaginal operations, in 15.37 per cent. anhemolytic streptococci were present.

When operation was done through the vagina, there was fever in 15.37 per cent., although again the non-virulent streptococci had been identified.

It is noticeable that in 19 spontaneous labors complicated by the presence of hemolytic streptococci, fever occurred in 15.79 per cent.

He concludes from his observations that in patients who have no fever at the time of labor, and where rectal examination only is practised, the presence of streptococci in the vaginal secretion before labor does not produce the slightest result. In other words, it does not influence the prognosis.

Kuhn has made experiments with glycerin to determine the acidity of the vaginal secretion in pregnancy, and finds that glycerin acts by increasing this secretion, and that in this sense it is an invaluable prophylactic.

Pregnancy Complicated by Myoma of the Uterus or Malposition of the Womb. Myomas of the uterus may exist during pregnancy in greatly varying stages of development. We are familiar with tumors of appreciable size which can be made out by examination, subserous or submucous in location. The former, unless low upon the uterine body, and impacted in the pelvis, rarely cause complications during labor.

Submucous fibroids, although considerable in size, usually permit the expulsion of the child, but may give rise to complications later in their removal.

Fibroid tumors in the uterine wall may be so abundant and symmetrical in development that they cannot be recognized during pregnancy, and their existence can only be inferred from failure in the normal action of the uterine muscle, or from abnormalities in the shape of the uterus, occasioned at times by the intermittent contraction and relaxation of the uterine muscle, which goes on constantly during pregnancy. If the patient be finally delivered through the vagina, the existence of these tumors may never be suspected. A long labor is ascribed to debility or resistance of the cervix, and labor is frequently terminated by forceps or version.

The reviewer has seen a number of these cases in which uterine action failed so completely that in the interest of mother and child delivery was accomplished by abdominal Cesarean section. This gave an opportunity to examine the uterine substance and to make an accurate diagnosis.

Recently a patient was referred to the Maternity Department of the Jefferson Hospital, in whose case a diagnosis of fibroid tumor complicating pregnancy had been made early in gestation by an experienced and competent physician. An abnormal projection connected with the uterine body could be distinctly made out.

The patient was kept under observation until term, when she was sent to the hospital. Upon repeated examination, there was no evidence of tumor within the vagina or pelvic cavity. Upon palpation, the results differed with repeated examinations. On some occasions the uterus was symmetrical and smooth, and on others a hard mass, apparently a portion of the uterus, could be distinctly made out.

As the patient had living children, and desired that this pregnancy should be the last, she consented to elective section, without labor. A living and fairly nourished child was delivered without complications. Supravaginal hysterectomy was performed, with the removal of the tubes and appendix.

Upon examining the uterus, the substance was seen studded with myomatous tumors varying in size from a marble to a pigeon's egg. The uterine decidua was unusually thin, and the placenta and child below the average in development. The tumors which had been discovered by palpation had evidently been caused by intermittent uterine contractions, which forced a portion of the uterine wall to project and temporarily altered the contour of the womb.

In two private patients, primiparæ beyond the usual age of first childbirth, the reviewer has performed elective section because the patients went over time without normal uterine action. In each case there were efforts at uterine contraction which were abnormal and feeble, causing pain and sleeplessness, but failing to produce descent, with shortening and dilatation of the cervix. The behavior of the uterine muscle was such that the induction of labor was declined

because it was feared that engagement could not be secured and that vaginal delivery would prove damaging to the mother, and very dangerous to the child.

Operation justified the diagnosis which had been made of some abnormal condition of the uterine muscle, probably multiple fibromas. In each case the uterine muscle was studded with small growths, a few of the smallest being beneath the peritoneum and too small to be detected by palpation. Fortunately, the anterior surface of the uterus was the least involved, and it was possible to extract the child through the anterior incision and to close the uterus through healthy tissue. Both patients recovered without incident. One afterward developed ectopic gestation, preceded by abnormal menstruation. The other has menstruated normally.

In one case the child was fairly nourished, a male, and with a normal placenta. In the other, the child was a female, not especially well-nourished, and the placenta correspondingly under weight.

In primiparous women who first become pregnant after the usual time for the beginning of child-bearing, failure in the action of the uterine muscle at full term, must occasion anxiety to the obstetrician. If the condition is one simply of rigidity of the cervix and deficient nervous stimulus, the cervix will be found rigid on examination, and a simple tonic, with exercise, will increase nervous energy.

Pregnancy Complicated by Ventrofixation of the Uterus. Fergusson¹ writes concerning the operation of ventrofixation and the complications which result in subsequent pregnancy.

After reviewing the literature, he states that on one occasion he had performed Cesarean section upon a woman who had the operation of ventrosuspension previously. Following this ensued a pregnancy which terminated in the spontaneous birth of an eight months' child. At section he found the cervix high up, and did not anticipate difficulty in labor until gestation actually occurred.

Routh's collection of 1282 Cesarean sections done by British operators included 7 in which ventrofixation was the cause of the dystocia which necessitated section.

He also quotes the interesting case of Blackmore, in which a multipara had multiple pregnancy followed by convulsions at labor. The case was triplets.

As the patient's previous confinements had been normal, the convulsions are ascribed to the fixed position of the uterus, resulting from a ventral fixation five years previously.

His section is interesting as illustrating the results of ventrosuspension upon subsequent pregnancy. The patient stated that during this pregnancy she did not feel as she had previously, and in the eighth month she had sudden hemorrhage, which spontaneously ceased.

¹ Journal of Obstetrics and Gynecology of the British Empire, September, 1912.

At labor the cervix was very far up, admitting two fingers, the fetus in transverse position, and the membranes intact. The attending physician failed to deliver by version.

The patient was taken to the hospital in a cab, with rapid pulse. Cesarean section was done twenty hours after labor, and the uterus was found fixed to the anterior abdominal wall by a strong fibrous band about two inches above the pubis. The uterine wall above the adhesion was very thin, and below greatly thickened. Considerable hemorrhage followed the opening of the uterus, which was soon controlled. The child could not be resuscitated. A band of adhesion was severed, the uterus closed and left, and the patient was sterilized. She made a good recovery.

He also quotes Brown's case, where the fundus was firmly adherent to the scar in the anterior abdominal wall. The uterus was so high that it could not be reached, and the uterine wall very thin. The child was safely delivered, and the mother sterilized by ligating the tubes.

As regards the treatment of retrodisplacements, he favors intra-uterine shortening of the round ligaments, but believes that a large number of cases can be controlled, if not cured, by the proper use of a pessary, and that in childbearing women any surgical procedure for the relief of retroversion should not be resorted to until other methods have been tried without success.

The reviewer has twice performed Cesarean section for this condition. In each of the cases a strong band of adhesion practically fastened the anterior wall to the abdominal wall. Pregnancy had resulted in great distention of the posterior uterine wall in which the foetus largely developed. The cervix was behind the symphysis and could scarcely be touched by vaginal examination.

With the consent of the patient, sterilization was effected by hysterectomy. The operation resulted successfully for mother and child.

In view of this and other similar reports, we believe that ventrosuspension should not be undertaken in women who have not passed, or are not near, the menopause. While the operator may intend to perform suspension only, he cannot be sure that a practical fixation will not result. If the suspensory ligament which forms after operation is sufficiently strong to maintain the uterus in anteversion, it will interfere with the development of the uterus during pregnancy, and may occasion dystocia.

Those methods of securing anteversion by surgical means should be chosen in childbearing women which alter the tissues least and interfere least with the possible development of the uterus. In our experience, the intra-uterine shortening of the round ligaments is best.

We have recently had under observation a patient in whom retro-

version had been cured by an extensive pleating together of the broad ligaments, bringing the uterus forward and over the pubis. Pregnancy was accompanied by considerable pain and distress, but labor was spontaneous, with good uterine contractions.

So soon as the uterus was emptied it failed to rise normally in the abdomen, and remained remarkably low in the pelvis during convalescence. The patient developed thrombosis of the superficial veins of the left lower extremity, with slight elevation of temperature, and moderate swelling of the limb. At convalescence the uterus was in mid-position, movable, without pain, and the cervix backward.

Adhesions resulting from salpingitis and operations upon the Fallopian tubes may also complicate pregnancy and interfere with the development of the fetus.

The reviewer has recently performed section upon a patient who had resection of an ovary following pelvic inflammation upon the right side. Upon section, it was found that a strong band of adhesion passed from the right broad ligament to the uterus, causing the uterus to develop in extreme dextrotorsion, and greatly limiting the normal growth of the womb. It was very difficult to eventrate the uterus at the time of operation. The child was small but well-developed. Hysterectomy was performed, removing the right ovary, and leaving the left. The appendix was altered in position by the adhesion, was considerably swollen, and was removed. The patient made a good recovery.

Retroversion during pregnancy may be caused by a subserous fibroid, as in a case reported by Klein.¹ The amniotic liquid had escaped three days before admission to the hospital, the umbilical cord had prolapsed, and the patient's pregnancy was complicated by a subserous fibroid.

Upon section it was found that the child had developed in the left uterine cornu, the right being largely occupied by the tumor. It was difficult to recognize the cervix, and the mass was removed by extirpation. The patient made a good recovery.

LABOR AND ITS COMPLICATIONS

Fatal Intra-uterine Bleeding during Labor. Stoeckel² reports the case of a patient in her second labor who collapsed suddenly. Pains had been in progress for twenty hours, when they terminated suddenly with great abdominal distress.

Upon examination, the membranes were unruptured, the heart-sounds good, and the mother's pulse not accelerated. The patient

¹ Monatsschrift f. Geburtshülfe und Gynäkologie, 1912, Band xxxv, Heft 4.

² Ibid.

was brought as soon as possible to the hospital, where the abdomen was found greatly distended. The membranes were unruptured, and the foot of the fetus brought down. An hour later a second collapse occurred, with rapidly failing pulse, and the development of dulness in the left portion of the abdomen.

Abdominal puncture showed fresh blood. Upon section, there was profuse abdominal hemorrhage which was traced to ruptured veins on the posterior surface of the uterus, near the internal os. There seemed to be a defective portion of the uterine wall at this point. The uterus was at once emptied by incision, and the child extracted, followed by hysterectomy. The patient did not survive the operation, dying from anemia and heart failure.

Those who have often seen the pregnant uterus in the open abdomen must have been impressed by the great size of the veins of the broad ligament and surrounding tissues. In several sections undertaken for contracted pelvis or other complications, some of these veins have oozed blood during operation, and required closure by suture. In one case in which the patient had been subjected to violent and unsuccessful attempts at forceps delivery before operation, some of the smaller veins at the base of the right broad ligament had ruptured, and oozing was in progress when the abdomen was opened. None of these cases resulted fatally, but when the size and number of the veins are considered, the comparative rarity of death from hemorrhage following their rupture may well be considered remarkable.

Spain¹ has studied labor in elderly primiparæ. The literature of this subject does not indicate that such pregnancy is more grave in outcome than among younger women. There is a preponderance of twins. The rigidity of the cervix and perineum, thought to be so frequent in these cases, is encountered less often than expected, delay in labor usually occurring from feeble uterine contractions, excessive size of the child's head, and abnormal presentation.

In view of these facts, the induction of labor is indicated in many of these cases at thirty-six weeks. The use of the dilating bag, to which is attached a light weight, will be found useful in the management of these cases.

A case of *missed labor* is reported by Thaler² in an idiotic cretin, aged thirty-eight years, and pregnant for the first time. The pelvis was firmly contracted.

The patient was first seen in the eighth lunar month of pregnancy, and suffered from severe attacks of irritation of the uterus without typical labor. The cervix did not dilate, and the symptoms of labor subsided. Five weeks after the first symptoms of labor at term, the cervix partly dilated and the head of a macerated child presented.

¹ American Journal of Obstetrics, March, 1912.

² Zentralblatt f. Gynäkologie, 1912, No. 19.

Delivery was effected by embryotomy. The fetus was 54 cm. in length and proportionately large.

Prolongation of pregnancy beyond the usual period is not uncommon among the insane and those mentally deficient. It is difficult to induce labor in these cases because they are often uncontrollable, and as the life of the fetus should not be preserved at the expense of the mother, the obstetrician has the choice of letting the patient finally come into labor and of delivering her by embryotomy, or of terminating pregnancy by section. The former is usually the mode of treatment selected, unless sterilization has been decided upon, and the necessary permission from responsible relatives or guardians has been obtained.

In the *Annali di Obstetricia*, March, 1912, Decio reports two cases of *miliary tuberculosis with meningitis complicating labor*. Both were followed by a fatal termination, and autopsy revealed the characteristic lesions.

An interesting case of hemorrhage during labor from *rupture of an aneurysm in the splenic artery*, is reported by Weisenberg.¹ The patient, an ill-nourished multipara, had suffered greatly from disturbance of the stomach, and just before admission to hospital had taken a long walk. At evening she was seized with severe pain in the abdomen and back, without vaginal hemorrhage. Fetal movements ceased, and the patient suffered greatly from prostration.

Upon admission to the hospital, she was very pale, with rapid pulse, and slightly subnormal temperature. The heart and lungs were normal, the urine contained albumin, the abdomen was distended and sensitive, especially in the region of the liver. The uterus was tense and very sensitive to pressure. Neither fetal parts nor heart-sounds could be made out, but the uterus was contracting feebly. There was no evidence of fluid within the abdomen. The cervix admitted one finger only, and the fetal membranes were very tense, the head of the child being movable above the pelvis.

It was thought that the patient was suffering from separation of a normally implanted placenta, and the membranes were ruptured and a dilating bag introduced. The patient grew somewhat better, and a dead child was expelled followed by uterine contractions, and no hemorrhage. The placenta was removed with very little bleeding. The patient's pulse improved, and she seemed considerably better, when ten minutes after the delivery of the placenta she suddenly collapsed and died.

Upon autopsy the source of hemorrhage was found to be an aneurysm in the splenic artery which had ruptured. The left kidney showed hydronephrosis, and the right kidney had degenerated into a hydro-nephrotic sac. Similar cases have been collected by the author from the literature.

¹ Zentralblatt f. Gynäkologie, 1912, No. 15.

The Effect of Rupture of the Membranes in Labor. This interesting and important subject is treated at considerable length by Van der Hoeven.¹

He first considers the spontaneous rupture of the membranes and the part played by the bag of waters in birth. He finds that, normally, the rupture of the membranes is the last element in the phenomenon of dilatation, and premature rupture is brought about by the unusual tension upon the membranes occasioned by failure in the lower uterine segment and cervix to dilate. This tension may be caused by the adherence of the membranes around the internal os and by the firm and unnatural condition of the tissue at the edge of the os. When the os dilates normally, the lower uterine segment expands in the usual manner. When the membranes are preserved until the last moment, and then rupture, labor proceeds promptly, not because the membranes are ruptured, but because the cervix and lower uterine segment are easily dilated. Premature rupture of the membranes then depends upon the condition of the os and cervix, and, secondarily, the lower segment. The protrusion of the membranes through the os to any great extent lessens the dilating force of uterine pressure and tends to lengthen the birth; rapid dilatation of the cervix does not depend upon the size of the bag of waters. A large tumor composed of membranes and amniotic liquid is formed when the os is readily dilatable, and is not the cause of rapid or extensive dilatation. It lessens intra-uterine pressure and tends to retard labor.

The question may arise: Would not uterine tension be better, and labor more prompt with ruptured membranes than with an excessive tumor composed of membranes?

In estimating the effect of rupturing the membranes, one must remember that so long as they remain unbroken, the tension upon the amniotic liquid, in advance of the presenting part, cannot be greater than that in the remainder of the fluid with the amnion. Dilatation is caused then by the entire amniotic pressure, and not simply by pressure upon that portion of the amniotic liquid in front of the presenting part. When the membranes rupture they cease to dilate the cervix, and dilatation depends entirely upon the dilating part. The effect of pressure by the membranes depends somewhat on the direction of the birth canal and the direction in which the dilating force is applied. In many cases, if the membranes are unruptured, pressure is exerted in an unfavorable direction. In many instances, the preservation of the membranes unbroken really lengthens labor.

When the membranes rupture, the os is much more forcibly dilated than when the membranes remain intact. Uterine contractions become more vigorous and efficient.

His investigations in the clinic at Leiden show that labor is hastened

¹ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxx, Heft 1.

by rupture of the membranes. When dilatation has reached 4 to 5 cm., the rupture of the membranes is followed by the beginning of expulsion an hour and a half later.

He also takes exception to the fact that the end of the first stage and the beginning of the second is said to be marked by the rupture of the membranes. He finds that rupture of the membranes occurs at varying intervals in labor. In one-fourth of the cases, in accordance with the usual conception, when dilatation is practically complete; in one-fourth of the cases, too late; in one-fourth, prematurely; and in one-fourth, long before the usual time.

In 939 labors he found that in 18.5 per cent. the membranes ruptured spontaneously before the os was dilated larger than 5 cm.

As regards the effect of early or premature rupture of the membranes, as stated, the length of labor is lessened; labor pains are made more efficient, and the necessity for interference does not seem to be greatly increased.

In estimating the frequency of prolapse of the cord, he believes that the longer the bag of waters remains, the greater is the space into which the umbilical cord may readily prolapse, and that such prolapse is present before the membranes rupture, but is not diagnosticated until after rupture. Other factors beside rupture of the membranes predispose to prolapse of the cord, such as transverse presentation, abnormal shape of the fetal cranium, and pelvic abnormality.

Hugenberger's statistics show that prolapse of the fetal extremities is very little more frequent with premature rupture of the membranes than when the membranes break at the usual time.

It is often thought that by premature rupture of the membranes the presenting part may compress the anterior cervical lip behind the pubis. Interference with the circulation results in swelling and edema. When the pelvis is normal there is sufficient room, so that this complication cannot arise. In contracted pelvis, long-continued pressure may bring this about. It has often been asserted that lacerations of the cervix are more frequent when the membranes rupture before the usual time. This the author denies, and quotes 393 cases reported by Reinhard, Koch, Moser, Hellhake, Bayer, and Winkel, with but 5 considerable lacerations of the cervix. Winkel, in 216 cases, observed but 4; Krull, in contracted pelvis in which labor occurred with the membranes intact until the last moment, found 20.8 per cent. of cervical lacerations, and where the membranes ruptured prematurely but 18.9 per cent. The occurrence of cervical lacerations depends upon the dilatability of the cervix and not upon the rupture of the membranes. Postpartum hemorrhage is not more frequent when the membranes rupture early, and Ahlfeld asserts that the puerperal period is not more complicated, and that retention of the membranes is more frequent when they rupture late in labor.

It is usually asserted that premature rupture of the membranes predisposes to fever during the puerperal period. The author and others conclude that if the membranes do not rupture until the cervix is 4 cm. in diameter, that their rupture after that time exerts no unfavorable influence upon the puerperal period.

As regards the duration of labor with ruptured membranes and the occurrence of infection, statistics show that there seems to be little difference if labor lasts ten or twenty hours. If the child is born within an hour after the rupture of the membranes, the danger of infection is least of all. The best results are obtained when labor terminates within ten hours after the rupture of the membranes. When labor persists more than fifteen hours, the danger of infection is greater.

Fetal mortality is not influenced by the spontaneous rupture of the membranes, if this does not occur before the os has reached 3 cm. in dilatation.

As regards the artificial rupture of the membranes, various authors have recommended this procedure to bring on, or to increase, efficient uterine contractions. Occasionally when the pelvis is large and the pains seem to be excessive, the membranes have been ruptured to make uterine contractions less violent. If the head is movable above the pelvic brim, with a normal pelvis, and engagement is delayed, transverse position in shoulder presentation may develop, and this danger is obviated by the artificial rupture of the membranes. This is also recommended where excessively violent fetal movements cause the mother great pain, in eclampsia, and in overdistention of the uterus. In tetanic contractions of the uterus, the rupture of the membranes sometimes causes improvement. In contracted pelves, the course of labor depends upon the space in the birth canal, the elasticity and size of the cranium, and the strength of uterine contractions. Premature rupture of the membranes has no influence upon the first two factors, but improves the strength of uterine contractions. In contracted pelves, however, the membranes should not be ruptured until the obstetrician is sure that he can deliver artificially, if necessary, through the pelvis; or that the case is suitable for hebstiotomy, if required. The true conjugate should be at least 8.5 cm. to make premature rupture of the membranes justifiable. This diameter is fixed from the examination of 1174 fetal crania in which the biparietal diameter was made. In cases in which the children are unusually large, the biparietal diameter should not have been found greater than 10 cm., and usually 9 cm.

In breech presentation, Paulus and Granser believe that premature rupture of the membranes, when the os measures from 4 to 5.3 cm., does not influence labor unfavorably. They believe that the protruding membranes, which one often sees projecting from the vagina in cases of breech presentation, are not an advantage but really a detriment.

When the author finds that with an os measuring 4 cm., rupture of the membranes is no detriment, the interesting question arises, Under what circumstances is this followed by improvement in labor?

For reasons already given, the author advises the rupture of the membranes in uncomplicated cases with favorable presentation, with normal or very slightly contracted pelves, and with the true conjugate greater than 9.5 cm., as soon as the os is 4 cm. in diameter. This should be done between the pains and with the patient placed upon her side to avoid prolapse of the cord.

The author next proceeds to discuss the results of this line of action: Among 1310 primiparæ, the membranes were ruptured in 620; among 4236 multiparæ, in 1872. The study of the statistics shows that the rupture of the membranes hastened labor. In primiparous patients with dilatation of 5 cm., when the membranes ruptured spontaneously or artificially, dilatation in one-half of the cases was completed in an hour; while in the case of multiparous patients the child was usually born in an hour.

When the question of instrumental delivery is considered, he finds among primiparæ the frequency of forceps extraction, 3.6 per cent.; and, if cases of eclampsia are deducted, 3.2 per cent.; in multiparæ, 1.5 per cent. The average of both is 2.8 per cent.; in polyclinic practice, 4.3 per cent.; in primiparæ, 0.5 per cent.; in multiparæ, the average was 1.1 per cent.

Version was performed in 939 labors three times, or 0.31 per cent.; craniotomy once in 939 labors; Cesarean section and hebstiotomy nineteen times for pelves so contracted that it was thought unwise to rupture the membranes. There was no case of rupture of the uterus.

It was found that, by this method of premature rupture of the membranes, instrumental interference in the termination of labor was reduced two-thirds in clinic, and one-third in polyclinic practice.

Comparison of the statistics given by other clinics concerning the frequency of transverse position, shows that the Leiden clinic, with 0.23 per cent., compares favorably with other clinics, in some of which this complication was observed in 1.88 per cent., so that the percentage of prolapse of the cord—0.36 per cent.—is less than that quoted from other clinics.

Comparison between spontaneous and artificial rupture of the membranes shows that prolapse of the cord is more frequent after spontaneous rupture than after artificial. He finds no evidence that postpartum hemorrhage is more frequent by the use of this method of treatment. It is, however, observed that the weight of the child has a distinct bearing upon postmortem bleeding. The larger and the more perfectly developed the child, the greater the danger of bleeding.

As regards the result for the fetus, in no case, either in hospital or in polyclinic practice, could the loss of the child be ascribed to rupture

of the membranes. He also concludes that cervical lacerations were not more common than in other cases; nor was the puerperal period disturbed.

These conclusions are contrary to what is commonly taught upon the subject, and must be corrected by the observations and experience of those who read them. One factor of some importance the author does not mention, namely, the occurrence of infection in the child. This would come about through birth-pressure and inspiration of material from the amniotic sac or from the uterus.

Accidental Separation of the Placenta. Placenta Prævia. At present the profession is interested chiefly in the comparison of the results obtained by the older methods of treatment in these conditions with the results following delivery by section, abdominal or vaginal.

In deciding between the two, it is at once evident that the cases may be divided into those treated in domestic practice in the houses of patients, and those who receive hospital care. It is difficult to form an accurate judgment in estimating the value of the two sorts of treatment, unless we know the principal source of mortality in these two serious conditions. When large numbers of cases are studied, and accurate statistics are analyzed, it is found that contrary to the general impression, death usually results from septic infection and not from hemorrhage. It cannot be denied that hemorrhage greatly favors the occurrence of septic infection, but we all recognize the fact that a patient may be brought to death's door by hemorrhage and still rally, if septic infection can be avoided.

In the light of these facts, patients having hospital care are certainly in a much more favorable position for recovery than are those exhausted by repeated hemorrhage, with the unfavorable conditions for asepsis commonly present in private houses.

Another factor of great importance is the element of delay in treatment. With patients in a hospital, a diagnosis is more promptly made, and, in well-appointed hospitals, treatment of any sort can be instituted in a short time. In private houses an accurate diagnosis may be delayed for consultation, time may be lost in summoning assistance, and in preparation for some method of delivery. Hemorrhage is increased by delay, and also there is liability to septic infection.

The fact that a patient is in the hospital does not, of course, mean that abdominal or vaginal section is necessarily the method of treatment selected. Many obstetricians with hospital service prefer the older method of Braxton-Hicks and others, and rarely employ section; others perform section so soon as a diagnosis is made, and suitable preparations have been instituted.

At present, it may be said that the treatment of these conditions by section in well-appointed hospitals is becoming more frequent, and that the results are satisfactory.

An interesting complication arises in these cases where labor has been delayed and the patient has been examined by several physicians, and there is reason to believe that infection is present at the time of delivery.

The question naturally arises, "What can be done under these circumstances to save not only the life of the mother, but also her power of reproduction? Shall her life be risked in the effort to save the uterus if section is performed?"

If vaginal delivery be selected, version is done and the foot of the child brought down, and the body of the infant used as a tampon. No effort is made to save the life of the child. Delivery is not effected until the mother has had time to rally from exhaustion, and the uterus acts spontaneously. If possible, the fetus should be expelled without assistance. When this happens, the uterus should be emptied of blood-clots, the placenta being delivered, and a thorough irrigation with hot normal salt solution, or 1 per cent. lysol, should be followed by firm packing with 10 per cent. iodoform gauze. If extensive laceration of the cervix is present, with bleeding, this should be controlled by suture. Vaginal lacerations which bleed should be sutured, and the vagina firmly packed with bichloride gauze. Tonic doses of strychnine will secure firm uterine contraction and do much to aid in lessening the danger of septic infection.

In suspected cases, with delivery by abdominal section, unless the uterus be dark red in color and soft in consistence after the child and placenta are removed with the membranes, the uterus should be irrigated with hot salt solution poured into the uterine wound, and a firm packing of 10 per cent. iodoform gauze introduced into the uterus, the end being brought through the cervix into the vagina. After closing the abdomen and applying the dressings, the operator should thoroughly sponge out the vagina with bichloride solution, 1 to 4000, and pack the vagina with bichloride gauze, fastening together the ends of the intra-uterine and vaginal tampon. This packing should not be disturbed for from forty-eight to sixty hours, when it should all be removed, and the vagina again thoroughly sponged out with bichloride solution.

It must be remembered that cases of placenta prævia or accidental separation are prone to postpartum hemorrhage, and that this may turn the scale against an already enfeebled and prostrated patient.

In cases treated by abdominal section, one must keep in mind the condition known as uterine apoplexy. This is a condition in which the uterine muscle undergoes infiltration with blood, and softening, which prevents the prompt contraction of the uterine muscle and invites the development of infection. This condition may be recognized by the dark, prune-juice color of the uterus and the soft state of the muscle. Some operators would decline to leave such a uterus after delivery by section, and would terminate the operation by hys-

terectomy. In some of these cases the muscle fibers are found partially torn, and blood has been extravasated beneath the peritoneal covering of the womb.

This condition is most often seen at the placental site where the uterine muscle has been weakened by the growth of the villi of the chorion in early pregnancy and the subsequent development of the placenta.

In the last analysis, both methods of delivery now the subject of comparison are conservative. Neither would risk the life of the mother for the life of the child alone. In vaginal delivery the saving of the child's life is the exception, while in abdominal delivery a large number of children survive.

To be avoided in the treatment of these conditions are, rapid dilatation of the cervix to a considerable extent, which produces serious lacerations, and severe hemorrhage followed by the rapid extraction of the fetus.

While such a procedure may occasionally save an infant's life, it greatly increases the maternal mortality and morbidity. Vaginal section should not be performed in this condition if the placenta is previa. In these patients, the lower uterine segment and upper cervix are so engorged with blood that incision and delivery through this portion of the uterus inevitably causes severe bleeding; so rapid dilatation in these cases is often followed by dangerous hemorrhage.

In contrast to this is the interesting fact familiar to those who have performed abdominal section in these patients, that, so soon as the uterus is emptied, removal of the placenta is followed by the prompt cessation of hemorrhage.

Unquestionably, in domestic practice the use of rubber gloves in performing Braxton-Hicks' version and bringing down the leg of the child, is of great value to both patient and physician. Where the physician's grasp may be less secure, a little practice will enable him to overcome this disadvantage.

It is interesting to note that pituitrin is of value in these cases where it is desired to secure prompt and efficient uterine contraction; for long-continued stimulation, it seems at present to be inferior to strychnine.

Phillips¹ reports the case of a multipara who had had postpartum hemorrhage several times, and antepartum bleeding at her last confinement. When eight and one-half months' pregnant she was awakened by severe abdominal pain, followed by repeated syncope. There was no visible hemorrhage.

Upon admission to hospital, the uterus was large and tense, the cervix thick and firm, admitting two fingers, the membranes not bleeding; there was no vaginal hemorrhage. So soon as the membranes

¹ Journal of Obstetrics and Gynecology of the British Empire, March, 1912.

were touched by the gloved finger profuse bleeding followed. The vagina was tightly packed at once, and an abdominal band applied, which failed to check the hemorrhage.

Section was performed so soon as possible, and a saline fluid containing pituitrin extract was meanwhile injected into the axilla. Upon opening the uterus, a large quantity of blood and blood clot escaped. The child was dead and completely exsanguinated. The placenta was completely separated, the membranes intact, and the uterus flabby.

Hysterectomy was at once performed, with ligature of the ovarian and uterine vessels and suture of the peritoneum over the stump. The abdominal wound was closed, and the patient stimulated freely. She remained profoundly shocked for thirty-six hours, but gradually recovered. During convalescence, several pieces of slough were discharged from the stump, followed by a temperature of 102° F., which gradually subsided. She ultimately made a perfect recovery.

Berggren¹ describes the case of a multipara who had hemorrhage before her preceding labor. During the present pregnancy she had suffered from vomiting.

When labor commenced there was continuous loss of blood, amounting to about a quart. When brought to the hospital she was exsanguinated, the urine containing casts and albumin. The uterus was in tonic contraction. Placenta prævia was absent, the membranes unruptured, and the os firm, admitting two fingers.

Upon section there was some blood-stained serum in the peritoneal cavity, and the uterine surface was blood-stained in patches, due to extravasation of blood in the muscular substance.

As the patient had pulmonary tuberculosis, sterilization was performed by removing the Fallopian tubes. A portion of one of the red patches of uterine muscle was removed for examination. The child died from lack of development in the heart, but the mother recovered.

The uterine wall was found infiltrated by hemorrhage, and at the placental site the wall of the uterus was thin. The condition of the kidneys present may have had something to do with the occurrence of the hemorrhage.

Zweifel² reports 22 cases of separation with a normally situated placenta. He does not believe that lesions of the kidney in the mother, without other conditions, can cause this accident. Occasionally one can trace mechanical violence as a causal element. In most patients the relaxed condition of the uterine muscle, anemia, and the factors already mentioned, seem to produce the condition.

The maternal mortality in these cases was 32 per cent., the statistics published by others varying from 20 to 30 per cent. The fetal mortality was from 80 to 90 per cent.

¹ *Archiv. mensuelle d'Obstét. et de Gynéc.*, August, 1912.

² *Monatsschrift f. Geburtshülfe und Gynäkologie*, 1912, Festnummer, Band xxxvi.

Zweifel calls special attention to the danger of postpartum bleeding, which, in 9 of his 22 cases, was present, and in 4 seemed to be the final cause of the fatal issue. The iodoform gauze tampon, and, in some cases, the use of Momburg's bandage, are indicated. In 6 cases the placenta seemed much more thin and widespread in its attachment than normal, and this may have contributed somewhat to the accident.

In TREATMENT, those measures should be employed which permit of the most prompt emptying of the uterus. If section is determined upon, and placenta prævia be absent, vaginal Cesarean section gives good results.

Pankow¹ distinguishes two sorts of placenta prævia—one primary, where the ovum embeds itself upon the border of the lower uterine segment; and a secondary variety, where the ovum is attached to the body of the uterus but overlaps the lower segment and cervix by one portion.

Obviously, the first variety is the most dangerous. The blood-vessels of the lower portion of the uterus are greatly enlarged in both varieties. This part of the womb has little contractile power, and these enlarged vessels are not closed by the contractions of the upper uterine segment. The infiltration of the uterine tissue with fetal cells adds to the danger of the hemorrhage. The lower uterine segment is often overdilated, which is an unfavorable complication, and rupture of the uterus is not infrequent.

These facts indicate that treatment should be of such a character as to disturb these tissues as little as possible. Delivery by abdominal Cesarean section meets this indication best.

The maternal mortality of placenta prævia in hospitals by ordinary methods of treatment has not been brought lower than 5 to 10 per cent.; the fetal mortality from 50 to 80 per cent.

Pankow reports 38 cases of placenta prævia delivered in the Freiburg clinic by abdominal Cesarean section. The maternal mortality was 2.5 per cent.; the fetal mortality 2.9 per cent.

Davis² reports 7 cases of placenta prævia treated by abdominal Cesarean section, with the recovery of all of the mothers and three of the children.

He considers placenta prævia a variety of ectopic gestation, and believes that the reasoning which justifies abdominal section in tubal pregnancy and other varieties of pelvic and abdominal extra-uterine pregnancy justifies the same treatment in placenta prævia.

He also reports success by the intra-uterine compression of the abdominal aorta with the closed hand within the uterus in cases of severe bleeding with placental separation. While this pressure can

¹ Zentralblatt f. Gynäkologie, 1912, No. 40.

² Monatsschrift f. Geburtshülfe und Gynäkologie, 1912, Band xxxvi, Heft 4, and Surgery, Gynecology, and Obstetrics, December, 1912.

be maintained for a short time, it affords opportunity for transfusion and other stimulating measures.

Trapl¹ writes concerning the use of *pituitrin in placenta prævia*. His observations were made in the clinic at Brünn; 16 cases were treated, with the birth of 13 living children. The results for the mother were good, and severe uterine atony was present in but one case. In one case it was necessary to deliver the placenta manually because it was adherent.

Pituitrin was most useful in cases in which a small portion of the placenta only was over the internal os when the head was presenting and labor had proceeded so far that the cervix was shortened and partially dilated.

In these cases the membranes were ruptured and pituitrin injected, followed by labor in from five to twenty hours. In two cases, labor terminated within an hour. In other patients, combined version after the Braxton-Hicks method was performed, and a foot brought down to which was fastened a weight of 0.5 kilogram. Pituitrin was then given, when pains developed, which pressed the child against the placenta. At the moment of birth assistance was given in the delivery of the arms and head. In cases in which the cervix was very little dilated, the bag was introduced or the vagina tamponed.

Hauch and Meyer² report 11 cases of placenta prævia in which pituitrin was employed in the treatment. He believes that it is most successfully used when the patient is not exsanguinated, when the position of the fetus is favorable, when there is no mechanical disproportion, and dilatation of the os must be 3 cm. advanced. The uterus must also be contracting spontaneously before the remedy is administered.

In 3 cases of accidental separation of the placenta the membranes were ruptured and pituitrin given with a good result in 2, but no definite benefit from pituitrin in the third case. This remedy should be given hypodermically, and the use of alcohol should be avoided in cleansing the skin or in cleansing the syringe which is employed. Experience shows that alcohol interferes with the action of pituitrin. The dose was 0.5 c.c. in ampoules, and the dose was repeated in from three-quarters to one hour, if necessary.

Eclampsia. As regards the difficult and complex subject of the causation of eclampsia, this last year has seen no definite and well-defined addition to our knowledge.

Eclampsia is the culmination of toxemia usually manifested by convulsions. Toxemia may be produced so rapidly and virulently, if convulsions do not develop, that the patient becomes critically

¹ Monatsschrift f. Geburtshülfe und Gynäkologie, 1912, Band xxxvi, Heft 4.

² Archiv. mensuelle d'Obstétrique, October, 1912.

ill with vomiting, substernal pain, disturbed sensorium, and great depression of the vital centres.

So far as causation is concerned, unquestionably whatever disturbs metabolism profoundly, predisposes to eclampsia. Thus, recently a sudden change in temperature and humidity was followed by the admission of a group of eclamptic cases to the hospital, so that eclampsia is most common in spring and autumn, when the temperature changes are most extreme.

No one substance has been isolated as the only cause of toxemia and eclampsia. Two classes of substances are recognized as instrumental—one formed within the body of the mother only. This formation is accompanied by great disturbance in the functions of the liver, kidneys, intestines, skin, and lungs. Evidence of this condition is found in the altered state of the urine, with decrease in the amount of urea excreted, and increase in the bi-products of assimilation which normally should be formed into urea.

Care must be taken not to confound a lower percentage of urea with a condition of toxemia. Undoubtedly the mother stores up nitrogen during pregnancy for the nourishment of her fetus and the development of muscular force at labor, and such storage may be accompanied by lessened nitrogenous excretion; but in these cases the biproducts of metabolism are not present in an unusual quantity in the urine, although the urea may be diminished. On the other hand, where toxemia is present, not only is the quantity of urea diminished, but biproducts appear, which normally are not formed.

A very interesting relation exists between starvation and toxemia. Many of the conditions found in the excretions of the patient are the result of starvation; and on the other hand, toxic patients suffer from starvation. Which is cause and which is effect?

In the ultimate analysis, all cases of toxemia result in starvation, and clinically speaking, we sometimes fail in the treatment of the toxemia of pregnancy because we underfeed or starve our patients. Here our theoretical considerations must give place to the practical. It is more reasonable to give such a patient whatever nutritious food she craves than to limit her diet because we fear toxemia.

We also recognize substances formed in the placenta and in early pregnancy in the villi of the chorion as producing toxemia and contributing to cause eclampsia. Exactly what these substances are has not been demonstrated, but it seems reasonable to believe that they are ferments produced by the altered condition of the cells of the membranes and maternal decidua, and in early pregnancy by the ingestion into the mother's blood of the villi of the chorion.

So far as the prevention of toxemia and eclampsia is concerned, the danger of starvation must not be forgotten. Another source of error lies in placing too much stress upon the condition of the urine. The

state of the patient herself is of primary importance; the condition of the urine of secondary significance.

Great stress has been laid upon the patient's blood-pressure and pulse tension, but these vary greatly in proportion to the nervous susceptibility of the patient, and must be interpreted accordingly. That the patient must be carefully studied and critically observed is certainly true, and it is equally true that no one of the many factors in her case is absolutely decisive.

In regard to TREATMENT, toxemia and eclampsia again show the division which has taken place in obstetric practice between domestic and hospital care. Here, however, more than in placenta prævia, the advantages lie with the hospital. If no form of immediate delivery by operation is selected, but the patient is to have eliminative and expectant treatment, the hospital still offers superior advantages. The patient can be better isolated, hot packs, lavage of the stomach and intestine, bleeding, and hypodermic medication, can all be better done in hospital than at home. The necessity for operation may arise suddenly, and valuable time would be lost if the patient was in her own home. It is not surprising, then, to find that practitioners are sending their eclamptic and toxemic patients to hospital as often as possible.

Professional opinion is, as of old, divided into two groups, one favoring immediate delivery by that method which disturbs the patient least, and gives mother and child the best chance for recovery. Others hold that delivery does not cause convulsions to cease in all cases, that the fetus and placenta and their products are but one element in the problem, that anesthesia and interference during eclampsia add to the mother's risks, and that it is much better to assist the patient in Nature's efforts and await the gradual development of labor, which should be terminated as rapidly as is consistent with the safety of mother and child.

Those who urge immediate delivery do so in the interests of both mother and child, and would choose vaginal or abdominal Cesarean section. Should the cervix be obliterated and the os partly dilated, dilatation and extraction of the fetus might be selected.

The life of the child must not be regarded, as it may be born living, only to die from eclampsia. Children who survive birth must be kept under close observation, their excretions stimulated, and precautions taken to guard them from exposure to cold.

So far as statistics go, those most favorable at the present time result from the so-called expectant treatment, which consists in isolating the patient, stimulating the excretory organs, and assisting labor when it develops. The exact results of operative interference have not been sufficiently collected as yet to permit of an accurate comparison with other figures.

It is impossible to lay down positive rules for the treatment of all cases. Each case must be studied upon its merits, and that treatment selected which promises the best results for the mother. In exceptional cases, when the patient is seen early, having had but few convulsions, and when the birth canal is undilated and the fetus strong and vigorous, maternal and fetal life may be saved by prompt delivery by section.

The *expectant treatment of eclampsia* receives attention by Lichtenstein.¹ His observations were carried out in Zweifel's clinic at Leipzig.

He believes that the best results are obtained by combining *bleeding* with *Stroganoff's expectant treatment*; 500 c.c. of blood is taken immediately after onset without waiting for the occurrence of further convulsions. No bad results followed this method of treatment. Pulse tension was lessened and the toxemia was less. The number of convulsions was decreased to one-half or one-third of that seen in other cases. In 60 per cent. of cases convulsions ceased after the treatment was put in operation.

It is interesting to note that in his observation from 41 to 55 per cent. of eclamptic cases go on to recovery, or the recurrence of convulsions, independently of labor.

In studying eclamptic cases, the urine should be examined several times during the day, and such examination is as important as the taking of the temperature. The fetal mortality is better than by more active treatment, and his observations would indicate that the fetus and its appendages do not play an important part in the production of eclampsia.

In his own experience, 80 cases of eclampsia were treated with 5 maternal deaths, or 6.25 per cent. In twelve months in 60 cases, there was no maternal death.

He quotes the statistics of Walthard, Veit, Bumm, Engelmann, and his own—in all 91 cases with 8 deaths. He has collected 329 cases of eclampsia with 40 deaths, or 12.16 per cent.

Zweifel² gives his experiences in the value of bleeding in the treatment of eclampsia. He believes that in these patients the specific gravity of the blood is high, or 1054.5, and 798.9 of water. His and other statistics show that in eclampsia the blood is of unusually high specific gravity, and the quantity of water in the blood distinctly decreased. This is seen strikingly illustrated in the records of the specific gravity of the blood obtained in bleeding eclamptic patients. In primary bleeding the specific gravity ranges from 1049 to 1058; the quantity of water from 789 to 813; while in secondary bleeding the figures first stated were found. These figures, namely, those of secondary bleeding, correspond closely to other statistics showing the normal specific gravity of the blood in women who are not pregnant. After various

¹ Archiv f. Gynäkologie, 1912, Band xeviii, Heft 3.

² Ibid., Band xevii, Heft 1; Zentralblatt f. Gynäkologie, 1912, No. 51.

investigations as to the value of primary and secondary bleeding, he believes that the former is advisable.

His notes upon cases illustrate the abnormal conditions of the blood after repeated convulsions, and the advantages of bleeding. Observations upon pulse tension in these patients showed the marked effect of bleeding in lessening pulse tension.

In a series of 55 cases by combining bleeding with Stroganoff's expectant method of treatment, his clinic reports give a maternal mortality of 9.09 per cent.

In this connection, Lichtenstein's¹ extensive collection of statistics on the *mortality of eclampsia* may be of interest.

In 4585 cases, there were 955 patients in whom eclampsia occurred after delivery, or 20.83 per cent. The number of cases developing after delivery were sufficient to demonstrate the fact that delivery in itself alone is not adequate treatment for eclampsia.

In a further paper² the same writer emphasizes his contention by the report of further cases.

In the *Zentralblatt f. Gynäkologie*, 1912, No. 43, he draws attention to the fact that the death of the fetus during or preceding eclampsia increases the mother's chances for recovery, hence those who urge that narcotics should be avoided with these patients, because of danger to the child, find this precaution unnecessary.

Much attention continues to be given on the Continent to Stroganoff's method in the treatment of eclampsia. Before the Berlin Obstetrical and Gynecological Society, Stroganoff³ reported two typical cases of eclampsia treated by his method. One was in Bumm's clinic, and the other in Franz's wards.

The treatment consisted in giving morphine hypodermically, and chloral hydrate in 30-grain doses by mouth. Where dilatation was considerably advanced, the membranes were ruptured. Chloral was given after labor to prevent the occurrence of convulsions. One case was complicated by fever and rapid pulse, and digitalis and salt solution were used in addition to the other treatment. Both women recovered.

He quotes the results of others and himself, in recent cases—61 in all—with a maternal mortality of 6.5 per cent. The mortality in his wards at St. Petersburg had been 6.6 per cent.; the fetal mortality in the cases first cited was 18 per cent.; in the St. Petersburg cases, 21 per cent.

Stroganoff also studies the theory of his method of treatment in the *Zentralblatt f. Gynäkologie*, 1912, No. 45.

He believes that as we do not know the exact cause of eclampsia we cannot naturally attack it accurately. He quotes the statistics

¹ *Zentralblatt f. Gynäkologie*, 1912, No. 19.

² *Ibid.*, No. 47.

³ *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1912, Band lxx, Heft 1.

of those who have employed this method, in addition to his own experience.

A paper supporting Stroganoff's arguments is contributed by Zöppritz,¹ at the meeting of the Northwestern Society for German Gynecology.

An interesting discussion before the Society followed the reading of this paper.

Holste at Stettin² describes his success in using Stroganoff's method combined with salt solution, and in cases of high pulse tension, with bleeding.

Freund,³ at the Charité in Berlin, believes in early delivery, bleeding, and isolation.

In 551 cases delivered in the first hour, after the first convulsion, he had no maternal mortality. He was afraid to use large doses of narcotics because of their depressing influence.

Mayer, of Tübingen, had a successful result by injecting serum, which terminated the case favorably in between eight to ten hours.

Voigts stated that, in Bumm's clinic in Berlin, Stroganoff's method has now been superseded by prompt delivery. Where delivery can be undertaken before the patient has had severe convulsions, the mortality is reduced 5 per cent.; if she be delivered promptly in convulsions and in labor, the mortality rises to 15 per cent.; while by using Stroganoff's method only, the mortality was 30 per cent.

Freund, in criticism of Stroganoff's method, believes in the value of prompt delivery. Engelmann,⁴ in the clinic at Dortmund, changed the method of treatment from prompt confinement to an exclusively expectant method. He finds no essential improvement in the results. Of 53 cases treated with prompt delivery, the maternal mortality was 11.3 per cent., and when a more expectant method was followed, the maternal mortality was 10.8 per cent. He now uses both methods, in proportion to the conditions present in each case.

Olshausen⁵ has collected cases of eclampsia in eleven years in five large clinics of Berlin—in all 1639 cases. This number gives a fair idea of the frequency of eclampsia in a large city.

Freund⁶ gives the results of 551 cases of eclampsia, with a mortality of 17.2 per cent. He believes that both the clinics in the University of Berlin are not prepared to abandon prompt delivery in the treatment of eclampsia, and that they reserve palliative treatment for cases in which convulsions occur after delivery.

While they are not satisfied with their statistics, they are also not

¹ Monatsschrift f. Geburtshülfe und Gynäkologie, 1912, Band xxxv, Heft 4.

² Ibid., Band xxxvi, Heft 5.

³ Zentralblatt f. Gynäkologie, 1912, No. 40.

⁴ Ibid., No. 45.

⁵ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxx, Heft 1.

⁶ Archiv f. Gynäkologie, 1912, Band xcvii, Heft 3.

satisfied with a series of 18 cases at Bumm's clinic treated by Stroganoff's method only, with a mortality of 44.4 per cent.

Decapsulation of the kidneys in the treatment of eclampsia, still receives occasional notice, and Balser¹ reports three cases ending fatally. It is true that operation was not undertaken until the patients were desperately ill, and as a last resort.

He has collected from the literature of the subject 3 cases in which decapsulation was done before labor developed, with 2 recoveries and 1 death. Decapsulation after labor, with one kidney only—4 cases, with 1 recovery and 3 deaths. Decapsulation after labor, of both kidneys—91 cases, including 3 reported by Kupferberg, with 57 recoveries and 34 deaths.

One would infer from these statistics that the operation to be of value is best performed after delivery, and that both kidneys should be the subject of operation.

When one attempts to review the conflicting opinions upon the treatment of eclampsia, a definite conclusion cannot be reached from statistics only. In very few cases is one method pursued, except in combination with others, and in order to judge fairly of any one method it must be carried out to the exclusion of others. Thus, Bumm's 18 cases treated exclusively by Stroganoff's method, with high mortality, contrast sharply with other clinics where both delivery and narcotics are employed.

For some years the reviewer's personal experience leads him to believe that immediate delivery by operation is indicated in a small percentage of cases, and that such operation should invariably be section, abdominal or vaginal, the indications being both mother and child in good condition, few convulsions, and an undilated birth canal. To be successful, the operation must be done within an hour or two after the first convulsion, and at once it is obvious that in many cases of eclampsia this is impossible. Hence the importance of sending patients to hospital on the advent of the first convulsion.

In patients who have had many convulsions, and in whom the birth canal is softened or partly dilated, our treatment may be illustrated by a group of three cases recently admitted to the Maternity Department of the Jefferson Hospital.

One was a primipara, one a multipara, and one a multipara from whom one kidney had been removed two years previously for tuberculosis.

The primipara was admitted for nephritis, having casts, albuminuria, and high pulse tension, and swelling of the extremities and face. On milk diet and purgation she became worse and developed eclampsia. She was at once treated by rupturing the membranes; as she came into labor bleeding, saline transfusion, irrigation of the stomach,

¹ Monatsschrift f. Geburtshilfe und Gynäkologie, 1912, Band xxxv, Heft 3.

followed by calomel placed in the stomach through the tube, hot packs, and intestinal irrigation, were used. She recovered after giving birth to a dead child.

The multipara was brought in unconscious and had had severe convulsions for several hours. She was treated in a similar manner, and gave birth to a child that lived for twenty-four hours, and died in typical eclamptic convulsions.

The woman having but one kidney was also unconscious, and had had severe eclamptic convulsions for several hours. She was treated in the same manner.

All three patients made good recoveries, complicated by great excitement, which was practically mania. This lasted longest in the multiparæ, and was most brief in the primipara. The woman with one kidney had a brief period of active mania.

After labor, these patients were treated by hypodermic injections of strychnine, digitalis, and codeine combined; milk alternating with Rochelle salts was given by the mouth; and intestinal lavage was practised twice daily. Morphine and hyoscyne was given occasionally during the mania. The detention sheet was employed.

In each case the urine showed evidence of great disturbance, and, in one, was dark port-wine color, full of bile coloring matter.

It is difficult to advise those in general practice what to do in a case of eclampsia. Unquestionably the hospital is the best place, no matter what treatment may be selected. Should this be impossible, the non-operative treatment of eclampsia may often be carried out successfully at home, especially in multiparæ.

Puerperal Septic Infection. THE BACTERIOLOGY OF FEVER DURING LABOR. Sachs¹ contributes a very interesting and suggestive paper upon the bacteriology of fever occurring during labor.

His material consists of 672 cases, of which 78, or 11.6 per cent. had fever during labor. In a considerable number of these cases the bacteria which produced this phenomenon were in the genital canal of the patient before labor began. He found that fever usually began after the membranes ruptured, and that a pure culture of a given bacillus was most apt to cause a rise of temperature.

It is of interest to note that placenta prævia greatly predisposes to fever during labor. He found that hemolytic streptococci could produce fever, whether in pure culture or not. The temperature rises more promptly when these germs are present. With other bacteria the length of labor has great influence in causing fever, and also the presence of pure culture.

In addition to placenta prævia, the use of the tampon and the presence of decomposing blood in the vagina are also important. The streptococcus viridans had little effect in causing fever during labor.

¹ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxx, Heft 1.

The *Bacillus coli communis* was more prompt in its action, but even in pure culture was not very effective if labor was not prolonged.

Staphylococci had little influence so far as the length of labor was concerned. Any manipulation or accident occurring during the first stage of labor outside of the hospital, and without aseptic precautions, greatly predisposed to fever.

As a rule, when the temperature was less than 103° , and the pulse less than 100, streptococci were not the infective agent.

As regards the development of fever in the puerperal period after infection during labor, the hemolytic streptococci were far the most virulent, especially in pure culture. The more frequent and serious the wounds and injuries occurring during labor, the greater the danger of puerperal infection. In cases where fever develops during labor, operative interference should be avoided if possible. The obstetrician should wait until he can readily terminate labor before interfering, and should choose his method of delivery with the idea of doing the least possible violence to the patient's tissues. Those substances which stimulate uterine contractions should be used in preference to operative procedures.

Koblanck¹ reports a series of operations for puerperal septic cases; 44 patients having general septic peritonitis were treated by operation, and 23 without operation. Of the 44 patients 9 recovered and 35 died; 15 of these patients had hemolytic germs in the blood, and among these were 4 recoveries.

Among the 23 treated without operation, 1 recovered and 22 died.

It was observed that the more promptly the operation was performed the better was the chance for recovery.

There were 72 cases in which the extirpation of a localized focus was undertaken. Among these were 11 extirpations of the uterus, with 3 recoveries and 8 deaths. In 8 patients, the tubes or ovaries were removed, with 5 recoveries and 3 deaths.

There were 35 operations for metastatic collections of pus; empyema 8, with 1 recovery; joint abscesses 9, with 7 recoveries; and abscesses in the skin and muscles 18, with 13 recoveries.

In 17 patients, some operation was performed upon septic veins, ligation in 7, with 4 recoveries and 3 deaths; exsection of veins in 10, with 3 recoveries and 7 deaths.

This operation was accompanied by extirpation of the uterus, tubes, and ovaries, and resection of veins was also performed with removal of the uterus and appendages.

In 36 pelvic abscesses, there were 34 recoveries and 2 deaths after operation, and in 5 cases of localized peritonitis there were 2 recoveries and 3 deaths.

¹ Zentralblatt f. Gynäkologie, 1912, No. 40.

Where the uterus was removed for septic infection he preferred the abdominal route.

SEPTIC THROMBOSIS. Septic thrombosis is recognized as one of the essential complications of puerperal sepsis.

In the *Archiv f. Gynäkologie*, 1912, Band xcvi, Heft 2, Duffek reports the results of his experiments on this subject in animals, and also observations upon the human being.

He finds that septic thrombi from the human subject have a nuclei or centre composed of leukocytes and threads of fibrin. Bacteria are present in some, and the method of the formation of thrombi indicates that bacteria precede the actual formation of a thrombus. At the placental site thrombi which had formed before infection occurred may contain bacteria, and this is common as a secondary infection. It is not easy to produce septic thrombi in a uterus which either during pregnancy or in the puerperal period, is not engaged in active contraction.

In the *Zentralblatt f. Gynäkologie*, 1912, No. 12, Hüssy reports 6 cases of puerperal sepsis in which a bacteriological examination was made to determine the cause of the fever. The results of the investigation were such that it was very difficult to determine accurately which infective agent was the cause of the fever; and care must be taken to avoid error in diagnosis from this source.

That sepsis may arise during the puerperal period outside the genital tract has long been known.

Nürnberg¹ reports the case of a patient confined thirteen days before she was seen, suffering from fever and prostration. The birth was very rapid. No one has made an internal examination, nor could any trace of interference with the genital tract be found. Four days after labor the patient had pain in the right leg. Previously, the temperature had been normal.

Eight days after the birth of the child, the patient got up, felt weak and miserable, and had a chill; the pain in the right leg increased. This was followed by vomiting and great prostration.

Upon examination, after admission to hospital, the veins of the inner side of the thigh were found to be greatly enlarged, and the skin about the veins was swollen and red.

A diagnosis was made of thrombophlebitis of septic origin. The patient died nineteen days after delivery.

Autopsy revealed septic infection with degeneration of the heart, liver, and kidneys, and very extensive thrombosis of the veins in the upper portion of the thigh and pelvic region. No cause could be found for this condition, as there had been no interference whatever practised with the genital organs during labor.

Nürnberg has collected from the literature cases of septic infec-

¹ *Zentralblatt f. Gynäkologie*, 1912, No. 10.

tion in the puerperal period which could not be referred to the genital tract.

Among these were tuberculosis of the peritoneum and perforating ulcer of the stomach, tuberculosis of the peritoneum and perforating ulcer of the duodenum, appendicitis, tubercular meningitis, typhoid with perforation, osteomyelitis, and others.

Pankow¹ contributes a paper upon endogenous infection in obstetric cases.

He found that in 5 per cent. of primiparous patients with uncomplicated labor spontaneous infection with endogenous bacteria developed. Vaginal examination increases the percentage by 4 per cent.

In multiparæ, endogenous infection develops in 3 per cent., with the addition of 2 per cent. for cases examined. In multiparæ such infection may be expected in 3 per cent. of uncomplicated labors, with the addition of 2 per cent. if vaginal examinations be made. In two cases this infection became fatal.

It is impossible to accurately determine whether operative delivery increases the mortality among these patients.

As regards the external origin of the infection, it is most usually found in the tissues just external to the birth canal.

These studies would indicate that it is safer to trust to the normal condition of the birth canal before labor than to attempt disinfection.

The Treatment of Puerperal Phlebitis. Vanderts and Paucot² review this subject from the standpoint of treatment. They find that antiseptic precautions and the prompt repair of lacerations lessen the occurrence of this complication.

The result most feared in these cases is the occurrence of embolism, and to guard against this the patient should be kept as quiet as possible, and the swollen thigh immobilized as completely as the patient's comfort will permit. It is doubtful whether any external application is of value.

Pinard employed compresses wet with a citrate solution of the hydrochlorate of ammonia. If vesication occurred, this application was removed, and powdered starch substituted. Considerable comfort can be given by bandaging the affected limb with carded wool, or other soft material.

The constitutional treatment demands tonics and stimulants, and, if the pain be excessive, the careful use of opium and its derivatives. During convalescence, an elastic bandage carefully applied, is of use. In cases in which thrombosis persists after the patient becomes convalescent, it may be advisable to exsect a considerable part of the affected vein.

When the uteropelvic veins are involved, the treatment of septic

¹ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxxi, Heft 3.

² Archiv mensuelle d'Obstétrique, December, 1912.

infection, appropriate in other cases, should be employed. Serum may be used, artificial abscesses produced as a counter-irritant, silver ointment, and various antiseptic substances have been employed. None of these, however, have proved of decided value.

The authors have collected from the literature 82 cases of surgical intervention, followed by 33 recoveries and 49 deaths. This high mortality indicates the seriousness of the condition.

The question arises, Under what circumstances may operation be undertaken with a fair prospect of success? The analysis of the successful cases shows that the thrombophlebitis was not accompanied by pelvic abscess or extensive septic processes. The infection was limited to the veins, and the veins were readily accessible because of the sound condition of the surrounding tissue. When thrombophlebitis is present, accompanied by metastases, which will form early in the case and in considerable number, surgical intervention is useless. When, however, after the patient has been ill for some time, and her symptoms have grown better, if relapse occurs with the return of chills and fever, surgical interference may be useful.

In operating, one may choose the vaginal route, the extraperitoneal abdominal operation, or the transperitoneal abdominal operation.

The advantages of the abdominal route are that it gives a more complete opportunity to examine the tissues and makes possible a more thorough operation. In the majority of cases ligature of the veins is followed by improvement. If the veins are excised, it is useful to employ the thermocautery to efficiently sterilize the tissues surrounding the vein at the point of section. Care must be taken in dissecting out the veins to avoid the ureter, as this has been wounded in some operations. In some cases it is necessary to drain an abscess of the broad ligament which accompanies septic phlebitis. In other cases where pus may not form, the tissues around the vein are considerably infiltrated.

In general, it may be stated in regard to puerperal septic infection that, in the present stage of our knowledge, we recognize the importance of prophylaxis not only in the matter of antiseptic precautions during labor, but in the prevention of hemorrhage, the avoidance of serious lacerations, and immediate suture whenever possible.

The reviewer is convinced from clinical experience, that the use of 10 per cent. iodoform gauze as an intra-uterine packing in cases of artificial delivery through the vagina is of great value in preventing the development of septic infection.

In cases which are brought into the hospital in labor, one must exercise special caution to obtain as complete a history as possible before resorting to operation. This is illustrated by the following case:

A competent physician having a good knowledge of obstetrics was

recently called in consultation by a general practitioner in the case of a vigorous and well-developed primipara. The general practitioner stated that the patient had been in labor thirty-six hours, that the membranes had ruptured, but that no interference had been practised. When the labor pains were inefficient and lagging, he feared complications.

Upon examination the cervix was but partly obliterated, the os admitted but one finger, and the cervix was unusually long and firm. The circumstances were such that a minute examination and inspection of the patient were impossible. The case was accordingly sent to the hospital as a clean case, possibly demanding delivery by section.

Upon questioning the husband of the patient, it was found that the general practitioner had given ether and had made some manipulation to dilate the cervix.

Upon examining the patient with a good light, several lacerations in the vagina were found which must have been caused by interference. The patient's temperature rose to 102°, and her pulse to 120. The position and presentation of the fetus were normal, the head was in the pelvic brim, and the fetal heart-sounds good.

Under these circumstances the patient was considered as infected, and a major operation was declined. No interference was practised. The patient was given strychnine, digitalin, and codeine hypodermically, the large intestine was thoroughly irrigated, and easily digested liquid food was administered.

After a long and tedious labor, occupying the greater part of three days and nights, the patient delivered herself spontaneously of a living child. The amniotic liquid was exceedingly offensive in odor, and the fetal appendages also.

Delivery was followed by improvement in the symptoms of the mother, but evidences of infection subsequently developed.

Here a useless resort to delivery by section would have greatly jeopardized the interests of the mother. There was no contraction ring present, nor was there danger of uterine rupture, as uterine contractions were inefficient and irregular. Under these circumstances, we were obliged to let the mother run the risk of infection, and our efforts were limited to open no fresh avenues for the entrance of bacteria.

In cases of neglected labor accompanied by infection, craniotomy should often be selected in the interests of the mother. While the heart-sounds may be heard, fetal mortality in these cases is so high from inspiration pneumonia and infection that no risk should be placed against the mother's life in the effort to save the child.

The majority of obstetricians at present do not place reliance on the positive identification of the infecting bacterium. To determine whether a given germ is hemolytic or not, is not always an easy matter,

and valuable time may be lost in this endeavor. The occurrence of mixed infection may reasonably be surmised when the lochial discharge is foul and there are evidences of infection in lacerated surfaces in the vagina and cervix. The presence of pus in the lochia confirms this opinion. When the lochial discharge is dark reddish and thin and without pronounced odor, it is reasonable to infer that streptococcic infection is present.

Especially useful in diagnosing the variety and severity of infection are the pulse and temperature. When the temperature is less than 103° and the pulse above 120, a mixed infection of no unusual severity is probably present. When, however, the temperature soon reaches 104° and the pulse 120 to 130, virulent streptococci are the infective germs.

The ratio between the pulse and temperature is also important, for a pulse greatly higher than the temperature would indicate shows a much disturbed nervous system, virulent poison, and deficient reaction. A subnormal temperature and a high pulse indicate, frequently, a fatal intoxication.

When the diagnosis of sepsis is made, the first question which naturally arises is that of interference with the genital tract. Here the effort must be made to ascertain whether the placenta was intact at delivery. If there is reliable evidence that such is the case, and the uterus is not greatly enlarged, interference should not be practised. If there is doubt concerning the entire removal of the placenta, the uterine cavity should be explored as gently as possible by the gloved fingers, or a large, smooth, blunt curette. Very gentle irrigation with salt solution, or 1 per cent. lysol, is useful. If this excites hemorrhage, packing with 10 per cent. iodoform gauze should be employed. The pack should be removed in thirty-six hours, and should not be repeated unless hemorrhage is so severe as to make it imperative. No further interference with the genital tract should be practised during the first days of the septic processes.

Tonic doses of strychnine, small doses of ergot, forced feeding with liquids, dry cold upon the abdomen with gentle counter-irritation, intestinal lavage, the continuous instillation of salt solution by the drop method, and such postures as promote uterine drainage, are all indicated. Fresh air is of the greatest value, and it is frequently a neglected agent.

In regard to the use of alcohol, it is questionable whether alcohol reinforces the immunizing properties of the patient's blood. It is a valuable narcotic, and combined with the external application of cold, will frequently produce sleep and avoid the necessity for using opium. But if the patient can be reinforced without alcohol she may assimilate more nourishment and do better. Sedative medicines should be avoided because they interfere with nutrition and in many cases depress the patient.

These measures will result in cure in 80 per cent. of septic cases. What more can be done in the remainder?

Surgical interference is indicated when the uterus contains a fibroid tumor and is infected. When a pelvic abscess or pyosalpinx is present, or when, after apparent improvement, repeated rise of temperature shows that the uterine muscle is the site of multiple abscess, if abdominal section be practised it should be followed by drainage of the pelvis with a Mickulicz bag, preceded by the removal of infected tissue.

If the vaginal route be selected, the uterus should be extirpated, or, if an effort is to be made to avoid sterilization, the posterior cul-de-sac should be widely opened, collections of pus evacuated, and Pryor's method of packing the pelvis with iodoform gauze should be employed.

Collections of pus, wherever they can be recognized, should be evacuated. The ligation or exsection of infected pelvic veins is not generally accepted as justifiable. When reinfection develops after improvement, and the veins can readily be recognized, but are not surrounded by pus or infected tissues, their ligation or resection may be beneficial.

The use of sera, vaccines, silver ointment, nuclein, fixation abscess, intravenous injections of iodine, and bichloride of mercury or alcohol, are measures which have been reported to be successful in some cases, but whose efficacy has been denied upon other occasions.

The development of puerperal mania after septic infection is by no means uncommon, and must not be overlooked. As such cases are often melancholic, they require close watching to avoid suicide.

Complete convalescence after puerperal sepsis requires an indefinite time. When the patient's nutrition has become fully established, and the lacerated tissues have healed, secondary operation may be necessary to repair lacerations and correct the position of the uterus. If the abdomen be opened, the operator must not neglect to inspect the appendix, and its removal should be a part of the operation, unless good reason exists for allowing it to remain. No case of puerperal sepsis can be considered as cured until the genital tract has been thoroughly examined during convalescence, and made as nearly normal as possible.

The problem of the care of the child in septic cases is sometimes difficult. The child must be at once removed from the breast and usually the secretion of milk is lost. If, however, the breasts do not become infected, and secretion can be maintained by gentle massage and the use of the breast pump, the effort should be made with the hope that the child can nurse when the mother is convalescent. The breast-milk should be examined bacteriologically before the child is allowed to nurse.

It must not be forgotten that other infections beside those arising

from the genital tract may complicate the puerperal period. Appendicitis, influenza, typhoid, pneumonia, rheumatism, and meningitis may cause an erroneous diagnosis of puerperal septic infection because they occur in a puerperal patient.

Abortion. Of late there has been special interest shown in the treatment of abortion complicated by fever, which naturally suggests interference or some operation for removing debris from the uterus.

Fromme¹ finds that the different varieties of bacteria often appear in the blood in incomplete abortion, with fever, and in some cases cause no serious result; while in others fatal infection develops.

It is important to note that after abortion, unless the uterus is empty, we can make no prognosis by a bacteriological examination. If the uterus has been completely emptied, a much more accurate diagnosis can be given by bacteriological examination.

In regard to preventive inoculation, he finds also that this is useless if a portion of the ovum is remaining, and chills and fever are usually dependent upon some abnormal material still within the womb.

The value of bacteriology in giving positive indications for treatment, was the subject of discussion before a recent meeting of the German Society for Obstetrics and Gynecology. This has been summarized by Holzbach, who concludes that bacteriology is not yet sufficiently advanced to give positive indications for a clinical opinion.

Schmidt² reports 692 cases of abortion in the gynecological wards of the Bremen Hospital.

It is interesting to note what part abortion plays in producing diseased conditions in a patient after her recovery. The percentage varies from 15 to 27, and the percentage of deaths from abortion to those from other diseases of the female pelvic organs varies from 6 to 31; 77.5 per cent. of abortions occurred in married women, and 22.5 per cent. in unmarried women. Two-thirds of the cases were at the end of the third month of pregnancy, and 78 per cent. in multiparæ.

When the cases of abortion are analyzed, one is impressed by the part played by retroflexion of the uterus, which far exceeds any other cause in frequency, and outnumbers criminal interference by 3 to 1. In this series there were 6 therapeutic abortions, 2 from pulmonary tuberculosis, 2 from nephritis in the same patient, 1 from disease of the heart, and 1 from melancholia.

A remarkably small percentage is assigned to syphilis as regards causation. In 34 cases examined by the Wassermann reaction, the test was negative in 85 per cent., positive in 15 per cent., so that one is impressed by the comparatively small part played by specific infection in the actual causation of abortion.

The criminal method usually employed was the injection of soap-

¹ Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxx, Heft 1.

² Monatsschrift f. Geburtshülfe und Gynäkologie, 1912, Band xxxvi, Heft 5.

suds into the uterus through a long, slender, hard rubber tube. In two cases this tube was broken off in the genital tract, and located subsequently by the x-ray.

The termination of abortion was by digital and instrumental emptying of the uterus after abortion had begun in 85.3 per cent.; in the remainder, abortion was spontaneous or terminated by digital and manual interference only, or by laminaria tents, the tampon, or the dilating bag. In most cases of interference, ether was employed, with the preliminary injection of pantopon-scopolamin. The quantity of ether necessary was greatly reduced, and the irritation of anesthesia very much lessened.

One hundred and forty-six cases were examined bacteriologically. Among these, 96 had either no fever or a very slight rise of temperature; and among these patients bacteria were found in the blood 3 times, and 47 times in the uterus. In 12 there were no bacteria in the blood, and in 34 none in the uterus. All of these patients recovered after the uterus was completely emptied; 68 cases developed septic infection, of whom 28 died, among them 14 who had been curretted before admission to hospital.

It is interesting to note that the presence of bacteria in the uterus, recognized by examination, had but little value as a clinical indication. Thus, in a number of cases where hemolytic streptococci were found in the blood and uterus, the patient's symptoms immediately disappeared when the uterus was completely emptied. In cases in which no bacteria were found in the blood, and in one case in which no bacteria were found in the uterus and in the blood, death followed soon after the instrumental emptying of the uterus; 13 cases of sepsis following abortion were treated with anti-streptococcic serum, with 7 recoveries and 6 deaths. In 12 cases of streptococcus infection, serum was used without any appreciable effect; 6 cases seemed slightly improved.

On the whole, the serum could not be depended upon. In 16 cases, pelvic peritonitis and abscess developed, followed by infection of the posterior cul-de-sac with drainage; 9 of the 16 recovered, and 7 died.

The colon bacillus found in the blood caused death in one case, and so did the *Diplococcus lanceolatus* found in the urine, although the blood was negative. One patient recovered in whose blood streptococci were found.

Abdominal section was performed in 16 cases, with 7 recoveries and 9 deaths.

The *treatment of abortion complicated by fever* is the subject of a paper by Warnekros¹ from Bumm's clinic in Berlin.

In his first group were 70 cases of sepsis following abortion, with

¹ Archiv f. Gynäkologie, 1912, Band xeviii, Heft 3.

high temperature and chills. Among these, streptococci were found in the uterus in 25, of whom 16 showed hemolytic streptococci. In 70 bacteria were found, evidently in the blood from the uterus. In 52 cases the infection was mixed; in 9 in all, pure cultures. In the 61 positive cultures in the blood, the streptococcus was present 20 times, mixed cultures 18 times, and in only 2 was the streptococcus alone. There were 9 cases in which the germs seemed positively hemolytic.

After the uterus was emptied, bacteria could not be found in the blood. No bacteria were found in the blood on the day following the operative termination of abortion. The lochia, after the uterus was emptied, contained bacteria for several days, and streptococci were abundant.

Among these 70 cases there were 10 of incomplete and long-continued abortion. Many of them had alarming hemorrhage; 7 cases were treated by no internal examination or interference. In these cases the abortion was incomplete, with retention of placental material. Streptococci were abundant in the lochial discharge in these 7 patients. In 1 of these peritonitis was present, and in 3 the blood showed severe septicemia. The patients were delirious. The blood was watery and lacked color, and swarmed with bacteria, usually in pure culture. In many cases there were injuries or lacerations of the genital tract, showing that criminal abortion had been attempted.

These cases illustrate how severe infection is after abortion where nothing has been done to save the patient. The cases terminated fatally, and at autopsy peritonitis and evidences of severe infection were present.

It is interesting to observe that in 9 patients a long-continued bacteriæmia developed, and when, after the uterus has been emptied, such a condition gradually develops, the prognosis is usually hopeless. It is thought that the question of interference should not be based upon the variety of bacteria which is producing the infection, but upon the question as to whether the case was comparatively recent or indefinitely prolonged and neglected.

The *bacteriology of abortion* is the subject of a paper by Sachs¹ from Winter's clinic in Königsberg.

After experiments upon animals and observations upon his patients, it was observed that the passage of bacteria from the uterus into the blood occurred equally with pathogenic and non-pathogenic organisms and with the peritoneum, as well as with recent wounds. This absorption of bacteria is a function of the living organism which considers the bacterium as a foreign body, and the fact of such absorption is no evidence of the pathogenic or non-pathogenic character of the infective germ.

¹ Zentralblatt f. Gynäkologie, 1912, No. 26.

It is impossible to classify cases or to lay down rules for treatment from the kind of bacterium which is isolated. Similar negative evidence is given by Bondy,¹ from Küstner's clinic in Breslau.

An interesting discussion upon the treatment of abortion with fever is reported from the Obstetrical Society of Berlin.²

Nagel had treated 570 cases in his clinic by the prompt emptying of the uterus. In 568 the curette was used; in 2 the fingers. The blunt curette only was employed. His results were excellent.

Nacke believed that abortion with fever should be treated aggressively, and that the uterus in early pregnancy is in a condition favorable for artificial emptying. Pieces of placenta should not be left after abortion.

Olshausen spoke of the advantages of iodine as an intra-uterine antiseptic.

Orthmann had observed 6279 cases of abortion, with a total mortality of 0.37 per cent. Among these were 382 with fever, with a mortality of 5 per cent. His cases were divided into three groups for treatment: One of 208 treated by the manual emptying of the uterus, using the fingers as an active agent; a second group of 97, where pledgets of gauze with the finger were employed; a third group of 77, where the finger and the curette both were used.

In the cases treated by the finger only, there occurred 5 deaths; in those treated by the finger and gauze, 5 deaths; and in those treated with the finger and curette, 9 deaths. Of these, 4 could be eliminated, as 2 were moribund when admitted to hospital, and 2 had perforation of the uterus with wounds of the intestine.

This series indicates that the finger is the safest instrument for emptying the uterus after abortion.

Fromme³ confirms the statements of others regarding the difficulty of identifying hemolytic streptococci from septic abortion. In discussion of his paper, Koblanck and Keller confirmed the value of the complete emptying of the uterus, Koblanck stating that with this treatment the mortality of abortion complicated by sepsis is 4.5 per cent.

Bumm and Winter take the more conservative ground that instrumental interference with septic abortion interferes with the zone of resistance and is followed by fresh infection. The question seems not to be one of emptying the uterus, but of emptying it in such a manner that additional harm shall not be done.

Those interested in this subject can find an excellent review of abortion complicated by retention of the placenta by Puppel.⁴

¹ *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1912, Band lxx, Heft 2.

² *Ibid.*

³ *Zentralblatt f. Gynäkologie*, 1912, No. 18.

⁴ *Monatsschrift f. Geburtshülfe und Gynäkologie*, 1912, Band xxxv, Heft 4.

Perforation of the uterus is a not infrequent accident which accompanies the curetting or emptying of the uterus after abortion or labor. Aschheim¹ demonstrated, before the Obstetric Society of Berlin, specimens from a primipara in the fourth month, who had hemorrhage treated by the use of the tampon. This was followed by the curette and forceps, which resulted in dragging down the omentum through a rent in the uterus.

The patient was brought to the hospital and immediately subjected to operation, when a perforation in the anterior wall of the uterus as large as a silver quarter was found, and protruding through this a piece of omentum 15 cm. long. This was resected and the uterus extirpated, with drainage. Examination of the specimen removed showed the presence of streptococci and staphylococci. The patient recovered.

Thaler² reports the case of a patient pregnant three months, who was curetted by a general practitioner to stop the hemorrhage following abortion. The uterus was dilated to admit a No. 12 solid bougie, the placental forceps introduced, but immediately upon withdrawal a loop of intestine was found in the grasp of the instrument. This was drawn out through the vulva but then replaced as far as possible.

The patient was immediately brought to the hospital. She was considerably shocked, and seemed to have lost a good deal of blood.

Upon section the abdomen contained a large quantity of fluid blood. The ileum, near its junction with the cecum, was torn from its mesentery for 50 cm. in length, bruised and infiltrated with blood. The vessels of the torn mesentery had been the source of the abdominal hemorrhage. The uterus had been emptied, but its posterior wall had been perforated. The uterus was extirpated, and the intestine resected for 54 cm. The bowel was closed by circular suture, and drainage was introduced through the vagina. The patient made a good recovery.

In discussion, Schauta believed that these cases are not so frequent as formerly. The profession are becoming aware of the fact that the pregnant uterus is frequently very soft and easily perforated. The majority of these perforations occur in the hands of the general practitioner who has not learned the danger of the proceeding. He believed that there was no operation so dangerous and so carefully to be undertaken as this. Usually the uterus is not dilated sufficiently and instruments are introduced blindly through a slightly dilated cervix. Frequently the practitioner does not ascertain accurately the position of the uterus. He had seen 10 cases of perforation with severe injury to the intestine. In 2 the sigmoid flexure had been pulled down; in one, a piece of peritoneum had been torn away; and, in

¹ Zentralblatt f. Gynäkologie, 1912, No. 14.

² Ibid., No. 19.

another the broad ligament had been perforated and the ureter exposed. In his 10 cases he had extirpated the uterus in 9, with 2 deaths. When patients were brought to the hospital, or when the perforation had happened in the clinic, there had been no deaths following extirpation.

He believes that usually the intestine should first be dealt with and then the uterus.

The *medicolegal aspects of perforation of the uterus* by physicians is the subject of a paper by Puppe.¹ He reports two cases, the first of which had a foul discharge from the vagina, and was thought possibly to be a cancer of the uterus. Accordingly, the patient was examined under anesthesia, and the cervix dilated by solid dilators. When a No. 14 was introduced, bleeding occurred, and the physician who operated inserted a tampon to check the bleeding, and then sent the patient to her home. Death followed shortly after, with symptoms of peritonitis.

The patient declined before death to go to the hospital.

Upon examination a large perforation was found at the internal os into the left parametrium, and an extensive tear of the peritoneum near the left ovary. A piece of placenta the size of a walnut was in the cervix.

The second patient endeavored to bring on abortion by hot baths and probably by manipulation, but this she denied. Hemorrhage and pain in the region of the sacrum led her to seek medical advice.

The physician undertook examination and curetting in his office. The cervix permitted the insertion of the finger, and fragments of the ovum were found in the uterine cavity. Exploration was completed with the curette and placental forceps. The uterus was irrigated with a uterine catheter, when it was noticed that the fluid employed did not return freely.

The patient was sent home in a cab. Symptoms of peritonitis soon developed, followed by death.

Upon examination the fundus of the uterus had been perforated near the entrance of the left Fallopian tube.

The author quotes 264 cases of this accident, 174 following the use of the curette, 35 the uterine sound and uterine catheter, 29 instrumental dilatation, 9 the placental forceps, 8 forceps used to remove the products of conception after abortion, 2 rods of various sorts, or sticks; 1 a spoon, 1 a catheter, and 5 the use of the finger only.

The frequency of this accident after the use of the curette draws attention to the danger which attends the employment of this instrument. The suggestion is also made that in all cases the physician should not inject fluid into the uterus unless he is positive that no perforation has occurred.

¹ Monatschrift f. Geburtshilfe und Gynäkologie, 1912, Band xxxvi, Heft 3.

It is also difficult, in cases of criminal abortion terminating fatally, where perforation of the uterus is found, to determine whether this occurred during criminal abortion, if the patient had been curetted by a physician.

Ruhl¹ comments upon Puppe's paper, and believes that physicians meeting with this accident are liable if they operate with a careless technique and without suitable appliances, and especially if they operate under circumstances where they cannot immediately proceed to remedy the accident so soon as it occurs.

With this view we are fully in accord, and we believe that nothing can be more dangerous than the inefficient dilating and curetting of the uterus which is sometimes attempted in a doctor's office. This is not a trivial procedure, and should be undertaken only with sufficient skill and experience to perform the operation safely.

In all difficult and complicated cases, we believe that the patient should be prepared for abdominal section, and that the operator should also prepare himself for section and any subsequent procedure that the circumstances may demand. The dilatation and exploration of the uterus should be done in the hospital only.

In our experience the following precautions are essential:

First, the general care which has just been outlined; then, at the time of operation, the bladder should be completely emptied by catheter, while the patient is anesthetized and before any procedure is undertaken. Bimanual examination should then be made to outline an abnormal position of the uterus, the presence of adhesions, or a tumor in the pelvis. The uterus should be firmly but gently grasped with stout tenaculum forceps, and time and patience exercised in performing dilatation. Unusual resistance, followed by the immediate and easy passage of a dilator should awaken suspicion. The operator should carefully examine the uterus with a blunt-pointed dilator to be sure that he appreciates the length of the uterine cavity. Before proceeding to curette, the uterus should be explored with a large-sized, blunt dilator, or with the finger, to be sure that this is intact. Small, sharp curettes should never be employed, and nothing but a spoon or large loop curette can be considered as safe.

Under no circumstances should irrigation be practised unless the operator is convinced that the uterus is intact. After curetting and irrigation, the uterus should be packed with 10 per cent. iodoform gauze.

If there is reason to fear perforation the abdomen should immediately be opened, and, if no fluid has been used and the perforation is in the wall of the uterus only, and the surrounding tissues are not damaged, it may be closed with catgut sutures. Tears in the peritoneum may

¹ Monatsschrift f. Geburtshülfe und Gynäkologie, 1912, Band xxxvi, Heft 6.

also be closed, but the pelvic cavity should be drained, after perforation, if the uterus is allowed to remain. In septic cases, if the tear is extensive, hysterectomy is indicated.

In the reviewer's experience, he once perforated a septic uterus with a large blunt curette while removing decomposed placental tissue and irrigating the uterine cavity. The abdomen was immediately opened, and a rent of half an inch found in the posterior wall of the uterus just above the internal os. This was closed by sutures, and a gauze pack introduced into the pelvis behind the uterus for drainage.

Although the intestine was not injured by the curetting, fecal fistula developed, probably caused by the pressure of the pack, from which the patient ultimately recovered.

Disturbance of the pulse is sometimes observed in cases in which the uterus is ruptured, and anesthetizers have reported that in these cases they were sometimes able to suspect rupture by a sudden variation in the pulse. This observation we have not been able to confirm.

An interesting observation on the *pathology of abortion* is made by Costa.¹ He finds in abnormal conditions of Langhans' layer a cause for abortion.

Abortion with dwarf embryos is reported by Lindsay.²

In one case, a possible cause for abortion was the glycosuria present in the mother. When the abortion sac is empty, the embryo was usually found in a degenerated and fragile state. When such separates from its attachment, it often completely liquefies. In one instance, the rudimentary cord was still remaining. In three or four specimens, the chorion was healthy and living, and this suggests the fact that the chorion may persist in spite of the disappearance of the embryo.

Hemorrhage in these cases was secondary and not primary, and the dwarfing of the embryos had preceded the occurrence of hemorrhage.

These cases are interesting from the standpoint of diagnosis, as it may be necessary at times to make a microscopic examination of debris removed from the uterus to establish the diagnosis of pregnancy.

In a case recently under the observation of the reviewer, the patient had missed a period but ten days when what was thought to be an unusually free period developed. As slight hemorrhage persisted, dilatation and curetting, under anesthesia, was performed, when no apparent fragments of the ovum could be found.

Upon microscopic examination of the scrapings, decidual cells could be clearly demonstrated.

The Puerperal State and its Complications. In the *Zeitschrift f. Geburtshülfe und Gynäkologie*, 1912, Band lxxii, Heft 2, Heckner contributes an interesting paper upon the *anatomy of the closure of*

¹ *Annali di Ostetricia*, 1912, No. 2.

² *Journal of Obstetrics and Gynecology of the British Empire*, April, 1912.

bloodvessels after labor. His paper contains two illustrations—cross-sections of uterine sinuses.

He finds that, in pregnancy and the puerperal period, the endothelia of the vessels and sinuses proliferate abundantly. As pregnancy approaches its end, this growth is reinforced by connective-tissue growth, which favors the formation of the sterile thrombi and emboli which close the uterine vessels.

Stroganoff¹ gives the results of his observations upon the *early getting up of patients after confinement*. He believes that the practice is useful, not only for the mother, but that it promotes successful lactation. He allows primiparæ to sit up in bed and to lift their children to put them to the breast on the day after delivery, and he believes that this practice lessens the puerperal mortality and morbidity.

His observations embrace 11,000 cases, of whom 800 primiparæ were allowed to get up on the third day, and the remainder on the fifth day. The puerperal mortality was 0.08 per cent. from sepsis, and 0.11 per cent. from non-septic conditions. Thrombophlebitis was observed in but 3 cases.

COLI BACTERIEMIA IN THE PUERPERAL PERIOD. Köhler² reports the case of a patient who, while in early pregnancy, aborted and was taken very ill following the drinking of white wine.

Upon examination, her symptoms were those of toxemia from some unknown source. Placental tissue was removed from the uterus, but no fetus was found. The urine contained albumin and was highly colored, and, upon examination with a spectroscope, showed methemoglobin. There were blood cells, and hyaline and granular casts in the urine. During the next few days the patient became very much jaundiced, and the bowel movements and urine were black in color. There was also abdominal pain.

The blood was sterile upon examination, but the patient developed chills, and on the day following the chill the pure culture of the *Bacillus coli communis* was obtained from the vagina and cervix.

Although the patient had high temperature and chills, she finally recovered.

In the second case there was a similar infection after abortion, and the patient was treated by salvarsan. A pure culture of the *Bacillus coli communis* was obtained from the blood in this patient, and although salvarsan was used twice, it had no effect. The patient developed abdominal pain, parametric tumors, delirium, collapse, and parotid bubo, followed by death.

At autopsy diffuse purulent peritonitis was present, with enlargement of the spleen and exudate over the surface of the liver and stomach.

¹ Monatsschrift f. Geburtshilfe und Gynäkologie, 1912, Band xxxvi, Heft 6.

² Zentralblatt f. Gynäkologie, 1912, No. 50.

The uterus and adnexa were adherent to the sigmoid flexure, and an abscess cavity the size of an apple had developed in this region.

In both cases the temperature curve showed great elevation, with great descent. There was high leukocytosis.

OBSTETRIC SURGERY

The Obstetric Forceps. In the *Bulletin of the Lying-in Hospital of New York*, March, 1912, Markoe publishes a concise and interesting paper upon the forceps and its use. He draws attention to the danger accompanying the use of the instrument, and the necessity for a thorough understanding of the anatomy of the pelvis and the shape of the forceps for the safe application of the instrument.

Two interesting papers upon the history of the forceps have recently appeared.

In the *Journal of Obstetrics and Gynecology of the British Empire*, September, 1912, Doran describes Dusée's forceps. This instrument was exhibited by a Scotchman in Edinburgh in 1733. The instrument had solid blades, the handles terminating in blunt hooks, and the blades kept in apposition by a thumb-screw, the upper fitting into a depression in the lower blade.

In the same *Journal* for January, 1913, Doran describes Burton's forceps. Burton is the "Doctor Slop" of Tristram Shandy. He died in 1771.

The forceps, like Dusée's, had a solid cephalic portion of the blade, the blades terminating in a centre single handle to which was attached a transverse portion at the outer extremity. The upper fitted over the lower into a groove, and by pulling upon the forceps the blades were brought into apposition with the head.

Doran believes that Burton did not actually use this instrument, but that he used what is known as the York forceps of the old French type, resembling Dusée's.

Cesarean Section. An interesting departure from the classic section is the procedure championed by A. B. Davis¹ at the Lying-in Charity in New York.

He makes a high abdominal incision above the umbilicus, does not remove the uterus from the abdominal cavity, separates the membranes carefully with the hand, interferes with the uterus as little as possible, and closes it as quickly as the circumstances permit. His results are good, but he is not satisfied that this operation is the best in all septic cases.

In his first series of 78 cases, the maternal mortality was 16.67 per

¹ American Journal of Obstetrics, December, 1912.

cent.; the fetal mortality, 13.75 per cent. In a second series of 69 cases, the maternal mortality was 5.79 per cent., the fetal mortality, 4.29 per cent.

The patient is allowed to sit up on the eighth day, and leaves the hospital about the twelfth day. He believes that the small, median, abdominal incision entirely above the umbilicus prevents adhesions between the uterine and abdominal wounds, has less escape of intestine and omentum, and less probability of subsequent hernia. Rupture of the uterus has occurred but once in his cases through the scar, and then only after prolonged labor. There were no symptoms, and only a small opening was made, the mother and child making a good recovery.

ACUTE DILATATION OF THE STOMACH FOLLOWING CESAREAN SECTION. A. B. Davis also reports acute dilatation of the stomach following Cesarean section which developed during operation. The patient had been long in labor and was exhausted, and took the anesthetic badly.

A similar case is reported by Ziegler, which terminated in recovery.

The one procedure which seemed to be useful was lavage of the stomach. Hypodermic medication seemed to be without avail.

The reviewer has seen one fatal result in a profoundly toxemic patient delivered by Cesarean section. Acute dilatation of the stomach developed, which was but slightly influenced by lavage and other treatment, the patient dying a few days after delivery. Her general condition was one of profound toxemia, and it was thought that the dilatation of the stomach was part of the general complication.

Various theories exist as to the cause of this accident: One, that ether swallowed during operation excites free secretion of mucus in the stomach, which decomposes and results in paralysis of the nervous supply of the stomach with passive dilatation.

Others, as in our case, ascribe the accident to a generally toxemic state. It has been most often seen in badly nourished and toxemic women who have been for a long time in labor.

The choice of Cesarean section in clean or suspected cases has occasioned considerable discussion. Peterson¹ reviews the conditions which may complicate Cesarean section and draws attention to the value of craniotomy where the child has been subjected to long pressure and the mother is undoubtedly infected.

Richter,² from the clinic in Dresden, reports 107 cases with no maternal mortality, and 0.9 per cent. of fetal mortality. He analyzes the different factors which increase and diminish morbidity, and believes that patients should be admitted to the hospital, if possible, two weeks before operation.

Operation is best performed before the rupture of the membranes,

¹ American Journal of Obstetrics, February, 1912.

² Monatsschrift f. Geburtshilfe und Gynäkologie, 1912, Band xxxv, Heft 3.

and when the cervix is partly dilated. The membranes should be ruptured through the vagina just before the uterus is opened. Ergotin or pituitrin should be given hypodermically just before the operation, and an elastic tube placed around the uterus as an additional safeguard. When the placenta is upon the anterior uterine wall a fundal incision is indicated.

It is very important that the patient should not have been long in labor nor have become exhausted. Cesarean section should not be performed upon patients who have fever with decomposed amniotic liquid, and upon patients who have been subjected to efforts at delivery before admission to the hospital. Internal examinations and the use of a dilating bag, if performed under the strictest antisepsis, do not militate against the operation, although they are undesirable.

CESAREAN SECTION AFTER VENTROFIXATION. Stickel¹ reports the case of a patient who two years before confinement had abdominal section, followed by suppuration in the abdominal wound which produced ventrofixation of the uterus.

At labor the child did not descend, and strong traction could be observed on the transverse scar where the abdominal wound had been made. The fetus lay obliquely in the womb, and the patient was delivered by section.

Owing to the adhesion to the abdominal wall, the uterus had developed much more on one side than on the other. The cervix was drawn upward above the promontory of the sacrum. On the posterior wall of the uterus the tissue had become so distended that the wall was scarcely thicker than paper. The adhesions were loosened, the raw surface covered with peritoneum, and the uterus closed.

The patient suffered during the puerperal period from some elevation of temperature because the cervix was slightly dilated, and the lochial discharge did not drain freely.

Jolly² also reports the case of a patient who had ventrofixation in Leopold's clinic. The fundus of the uterus was attached to the abdominal wall with one transverse silk stitch, and one upon each side.

Two pregnancies and labors followed, in which the patient suffered greatly. The first was terminated by abdominal section, but the child perished. In the second labor the cervix was drawn high up and uterine rupture was threatened. Abdominal section was again performed, followed by the removal of the Fallopian tubes. Mother and child recovered after this operation.

The reviewer has recently operated upon a patient pregnant for the second time, whose first pregnancy was terminated by abdominal Cesarean section. Eighteen months after operation, following sea bathing, a red point appeared in the abdominal scar, which discharged

¹ Zentralblatt f. Gynäkologie, 1912, No. 14.

² Ibid.

serous fluid for some time, but finally closed. While travelling, the patient was taken with severe nausea, and on reaching her home was examined by a physician, who diagnosticated retroversion of the pregnant uterus. He made strong traction to replace this and inserted a ring pessary. The patient was two weeks in the hospital, after which she was much improved.

When examined, the cervix was held backward by the ring pessary, an elastic tumor filled Douglas' pouch, and a second elastic tumor was found above the pubis. The diagnosis seemed to lie between adhesion of the anterior wall of the uterus to the abdominal wall, with development of the fetus in the posterior uterine wall, or pregnancy complicated by pelvic tumor.

At operation the anterior uterine wall was fixed by a band of firm adhesion, three fingers wide. In addition, a cyst of the left ovary completely filled the pelvis. The right ovary was half cystic, and the adnexa catarrhal. The adhesion limiting the growth of the uterus was severed, and the uterine surface carefully covered with peritoneum. The ovarian cyst and appendix were removed, and the cystic half of the left ovary also.

The patient made a good recovery without the interruption of pregnancy.

CESAREAN SECTION FOR COILS OF THE CORD ABOUT THE LIVING CHILD. That Cesarean section may be indicated in the interest of the fetus only is illustrated by a case reported by Briggs.¹

The patient was in her third pregnancy and admitted to hospital in labor. The membranes ruptured spontaneously, but dilatation was very slow. Morphine was given to relieve pain, but at the completion of the fifty-second hour of labor there had been no progress.

Examination revealed the cord firmly coiled several times about the fetal neck. The fetal heart was beating normally. The head had not engaged, and uterine contractions caused great suffering, without progress.

Upon section, the child was pale, but, on loosening the cord, revived, and made a good recovery. The mother recovered without complication.

The placenta was implanted on the anterior portion of the right wall of the uterus, and the coils had shortened the cord so that progress in labor was impossible.

That Cesarean section can be done under spinal anesthesia for eclampsia is illustrated by Marsh.²

He describes three cases of eclampsia delivered by Cesarean section under spinal anesthesia with stovain. The first patient's operation was terminated by supravaginal hysterectomy, as the uterus contained

¹ Journal of Obstetrics and Gynecology of the British Empire, April, 1912.

² Journal of the American Medical Association, September 21, 1912, Part 1.

fibroid tumors. This patient made a gradual recovery from operation. The child was stillborn.

In the second patient, the attending physician had introduced a catheter into the uterus for the induction of labor, but without success. She was delivered by section under spinal anesthesia with stovain, and, as the catheter was found in the uterine cavity between the membranes and the uterine wall, it was feared that septic infection might develop, and a complete hysterectomy was done. The patient recovered from the operation.

In the third case, a living female child was delivered, and both mother and child recovered from the operation.

Unusual indications for Cesarean section are illustrated in a series of cases reported by Schell.¹

In one of his patients placenta prævia was present; in a second, carcinoma; in a third, a previous history of difficult labor, scar tissue in the vagina and cervix resulting from a former operation, and an old ventral hernia. Cesarean section was followed by operation for hernia, preceded by sterilization.

In another patient with eclampsia, and who was unconscious, Cesarean section was performed without anesthesia, with the recovery of mother and child.

A fifth patient had a very firm contraction ring with great distention of the uterine wall above. Upon section, the head was firmly gripped in the lower portion of the uterus, and the ring had to be incised before delivery could be accomplished.

In a sixth case the pelvis was moderately contracted, the occiput rotated posteriorly, and axis traction forceps failed to deliver. Cesarean section proved successful.

These operations were all followed by the recovery of the mother.

ABDOMINAL CESAEREAN SECTION. Abdominal Cesarean section is the title of a paper by Schäfer.²

His method of operating consists in opening the abdomen above the pubis and performing essentially a transperitoneal section. The uterus is opened in the middle line just above the cervix and a small speculum placed in the upper angle of the uterine wound, which holds it firmly up against the abdominal wall. This prevents the escape of blood and amniotic liquid into the abdominal cavity, and keeps the intestine out of the way. The fetus is delivered by forceps or version, as may be necessary. The placenta is pressed out by compressing the fundus of the uterus. The uterine tissues are closed with a double row of catgut and the peritoneum stitched over the uterus. The abdominal wound is closed in four layers of catgut, and the skin with clamps.

¹ Surgery, Gynecology, and Obstetrics, August, 1912.

² Zeitschrift f. Geburtshülfe und Gynäkologie, 1912, Band lxxii, Heft 2.

He has operated by this method in 33 cases in the Franz clinic in Berlin, and, in his entire experience upon 50 cases, all of the children but 1 recovered, and 2 mothers died—a mortality of 4 per cent.

One patient had been repeatedly examined by a midwife and students before operation, and died of peritonitis caused by the *Bacillus coli communis*.

In a second case an effort had been made to deliver by forceps, but the forceps had slipped off from the head. This was followed by profuse bleeding, for which the patient was tamponed.

Upon examination there was an extensive tear of the cervix with incomplete rupture of the uterus. As blood was not found in the abdomen, cervical Cesarean section was performed.

At autopsy there was an abscess in Douglas' cul-de-sac, with purulent peritonitis and the pure culture of the *Bacillus coli communis*.

One of the great objections to delivery by classic Cesarean section is thought to be sterility following the operation. Von der Hoeven¹ states that more than half of the patients married, and not too old to bear children, do not conceive after Cesarean section. He gives no competent reason for this, and a search of the statistics show that the mortality of the children after Cesarean section is 5 per cent. He believes that adhesions following the operation which limit the mobility of the uterus would interfere with its development, and is a most common cause of this abnormality. He states that in Holland the average married woman has seven children, and contrasts this with the birth-rate among his patients, and finds a great decrease in fertility.

Our experience does not coincide with his, for we have repeatedly seen conception occur after Cesarean section, and have seen patients give birth to children in spontaneous labor.

While the development of adhesions is undesirable, it is not universal, and, in our experience, has not prevented conception.

A new method of performing the classic section in infected cases is described by Mueller.²

He turned the uterus out of the abdomen and brought together the abdominal wall temporarily with clamps. Upon incising the uterus, the membranes were dark green in color. The abdomen and abdominal wound were covered with sterile towels and the uterus surrounded by moist, warm compresses, the uterus turned forward upon its side, and opened in such a way that the amniotic liquid did not touch the abdominal surface or abdominal wound; 92 per cent. alcohol was applied to the interior of the uterus until the uterine walls had been thoroughly dried. Alcohol was also applied to the exterior of the wound. The uterus contracted vigorously, and its cavity was tamponed with gauze wrung out of alcohol. Alcohol was also applied to

¹ Zentralblatt f. Gynäkologie, 1912, No. 51.

² Ibid., No. 49.

the abdominal wall, and fresh compresses placed about the uterus. The uterus was closed with catgut, and the uterine incision very carefully covered with peritoneum. Iodoform gauze was placed over the uterine wound, and the peritoneum brought together over this. This gauze strip was removed on the third day.

The lochial discharge was somewhat offensive, and, on removing the abdominal strip of gauze, a suture and a very small quantity of pus escaped. The uterus was irrigated once with formalin, after which the patient made a good recovery.

The second patient was operated upon by essentially the same method, successfully.

That some operators still prefer the fundal incision in Cesarean section is seen by a series of cases reported by Caruso.¹

In 159 cases there were 17 maternal deaths, with a mortality of 10.6 per cent.; and 10 fetal deaths, with a mortality of 6.2 per cent.

Among the causes of maternal death were septic infection, 6 cases; cancer of the uterus, 1; injuries of the intestine in labor which was adherent to the uterus, 1; ileus, 1; eclampsia, 3; lymphangitis, 2; anesthesia, 1; shock, 1; and tetanus, 1.

In the *American Journal of Obstetrics* for July, 1912, A. B. Davis describes his operation, to which reference has already been made, and reports his results in 134 sections, with 17 maternal deaths; 136 children were delivered, of whom 112 survived.

McPherson² states the indications for abdominal Cesarean section, and favors the high incision and the non-delivery of the uterus from the abdominal cavity. He has had, among others, 12 successful sections for placenta prævia.

THE UTERINE SCAR AFTER CESAAREAN SECTION. Those who criticise classic Cesarean section believe that one of its great disadvantages is the weakened uterine wall with which the patient is left from the existence of the uterine scar.

Jolly,³ from Bumm's clinic in Berlin, reports the case of a patient with rachitic pelvis who had lost two children in labor, and whose third pregnancy was terminated by a classic Cesarean section. At this operation, the placenta was found upon the anterior uterine wall, and the uterus was opened upon the posterior wall to avoid the placenta. A vigorous child, living, was removed with the placenta, and the uterine wall closed with catgut. Eleven deep stitches were placed through the muscular tissue about 1 cm. apart, and the peritoneum was closed by a continuous suture.

The patient had moderate fever during eight days after the operation, but was discharged well, with her child, on the twenty-second day.

¹ *Annali di Ostetricia*, 1912, Nos. 5 and 6.

² *Ibid.*

³ *Archiv f. Gynäkologie*, 1912, Band xcvii, Heft 2.

Six months afterward conception occurred, and the patient returned to the hospital to be delivered by section, with sterilization. Labor pains began soon after her admission and became vigorous. The cervix admitted two fingers, the membranes were unruptured, and a pulsating umbilical cord could be felt through the membranes.

The patient was immediately prepared for operation, but, during preparation, it was discovered that the child lay directly beneath the abdominal wall. Uterine rupture had occurred while the patient was in transit from the ward to the operating room.

On section, the child and placenta were found in the abdominal cavity. The child was living and immediately delivered, and survived. The uterus had ruptured in the previous scar. The operation was terminated by hysterectomy, leaving the ovaries.

Mother and child left the hospital well, on the twentieth day.

Upon examining the uterus, it was found that the scar had separated through half its extent; the remaining half was firm and could only be detected by fine white lines in the overlying peritoneum. Portions of uterine tissue were examined microscopically. It was observed that, in the portion of the scar which had not ruptured, the regeneration of the muscle had been complete and that the tissue was normal in every respect. Where rupture had occurred there had been irritation during the process of healing, granulation cells were present, and connective tissue had developed between the muscle bundles. Evidences of infiltration had prevented complete primary union at the point where rupture occurred. Decidual cells had also developed in this tissue.

It is recalled that the patient had fever during eight days of the puerperal period, and evidently a portion of the scar became infected.

This is the third case in thirty years in the clinic in which the uterus ruptured through the scar. In the first case the uterus was closed with silk, and spontaneous rupture in the ninth month of pregnancy occurred, the patient being treated by section, with removal of a dead child from the abdomen. The entire uterine scar had ruptured.

In the second case, rupture occurred two weeks before term, the patient having had an operation for abdominal hernia in early pregnancy. At that time the uterus was inspected, and the tissues were apparently normal.

Harrar¹ contributes a very interesting paper upon this subject. He reports three cases of abdominal Cesarean section followed by vaginal delivery. One of these patients was assisted by forceps because it was desired to avoid the strain of long labor in view of the patient's previous section.

In 42 cases of repeated section, adhesions of the omentum were

¹ Bulletin of the Lying-in-Hospital, New York, June, 1912.

found in 16, which did not seem to affect the strength of the uterine scar. In 6 the placenta was attached over the region of the old incision without impairing the strength of the scar. In 7 the incision in the first operation had opened into the placental attachment. Suture of the uterus through the site of the placenta had given a sound scar.

In 4 cases there was a marked attenuation of the scar; in 2, the placenta was found directly under the old wound, and, in the other 2, the placenta was not in relation with the first incision.

These patients had fever during convalescence, and intra-uterine douches had been given. One of the thin scars produced by sloughing into the uterine wound was excised at a later operation. Microscopic examination of this tissue showed that it consisted merely of the peritoneal and subperitoneal cellular tissue. The muscular tissue had not healed primarily, but by granulation.

There were 4 cases of actual rupture of the uterus in, or adjacent to, the old scar. Examination of the tissue in the uterine scar after Cesarean section shows that when the uterine wound unites soundly no scar-tissue can be discovered. In three cases of rupture, the rent had occurred in a narrow strip of apparently normal muscle between two closely approximated parallel scars.

In regard to the method of suture which is least apt to be followed by rupture of the uterus, any material is adequate if it be aseptic, placed closely enough together, and passed deeply enough. The entire wound must be brought into complete apposition.

In performing Cesarean section upon a woman long in labor, with ruptured membranes, and who may be infected, there is always the danger of getting a poorly healed scar. In repeated section, it is better to excise the old uterine scar.

Intra-uterine douches should be avoided after Cesarean section, because of the danger of infecting and wounding the uterine tissue.

In selecting the operation upon patients who have previously had Cesarean section, one must be guided by the history as regards convalescence, with or without fever, if such history can be obtained.

The prognosis in repeated Cesarean section is the subject of a paper by Marioton.¹ His series embraces 23 cases in Bar's clinic in Paris.

He calls attention to the risk of uterine rupture after Cesarean operation, and quotes McPherson, Pinard, and Olshausen, with frequency of rupture in Pinard's report in 18.18 per cent. of cases; Olshausen, in 5 per cent.; McPherson, in 2.56 per cent.

In the cases reported, 16 were operated upon twice, 6 patients three times, and 1 patient four times.

It has been found that when the first section has been performed on a patient in good condition, under aseptic precautions, and the uterine suture carefully inserted, that there is no reason to fear rupture

¹ *Archiv mensuelle d'Obstétrique*, March, 1912.

in succeeding parturition. Repeated operations may be complicated by the presence of adhesions, in which those of the intestine are the most dangerous and should receive the most careful attention. In 3 cases the membranes were adherent; in no case was hemorrhage severe; and, in general, the repeated section was not more difficult than the first.

Cesarean section is sometimes necessary because disease of the vulva may make vaginal delivery impossible or very dangerous.

Armitage¹ reports the case of a Bengali woman in whom the external genitals had become a mass of hard warty tissue. The membranes had been ruptured for some hours and there was a foul discharge; but one finger of the gloved hand could be introduced within the vagina. The cervix was nearly dilated and the fetal head high.

Two methods of operation were considered: (1) To amputate the central mass, then to incise the labia and perform craniotomy on the living child; and (2) to deliver the patient by abdominal Cesarean section.

The second method was chosen, the uterus removed, and the vagina and broad ligaments closed. In three days the patient had a normal temperature, when the central portion of the growth showed signs of gangrene and was amputated as high up as possible, and healthy vaginal mucous membrane was closed over the stump.

In spite of a severe colon bacillus infection of the bladder, the patient recovered, and was instructed to return for the removal of the vulvar tissue in three months.

The same author, in the same journal, reports postmortem Cesarean section for aortic disease of the heart, operation being performed at the moment of death. A living child was delivered and revived, and left the hospital in good condition.

Extraperitoneal section is the operation of choice in many German clinics, and is receiving attention in other parts of the world.

Ferroni² has performed 11 extraperitoneal sections, 10 for pelvic abnormalities, and 1 for carcinoma of the rectum. He chose Latzko's method.

He believes that, in cases which are actually infected, extra-peritoneal section has no advantage over other methods, but in clean cases or those where infection, if present, is very mild, it may be useful. The best results are naturally obtained in clean cases. His operations were successful.

Litschkuss³ discusses the question as to the influence of extraperitoneal section upon subsequent pregnancy and labor. He reports 2 cases delivered by extraperitoneal section.

¹ Journal of Obstetrics and Gynecology of the British Empire, November, 1912.

² Monatsschrift f. Geburtshilfe und Gynäkologie, 1912, Band xxxv, Heft 5.

³ Ibid., Band xxxvi, Heft 1.

The first patient returned to the hospital one year and eight months after operation, and suffered during pregnancy from painful micturition. She was in labor when she returned to the hospital and the membranes had ruptured:

Upon examination, the old transverse scar could scarcely be made out, the fetus was in transverse position, the heart sounds good at the umbilicus, and the cord prolapsed and pulsating. Version was immediately performed after the Braxton-Hicks method.

To avoid injury to the tissues sutured in the former operation, no effort was made to deliver the child, and labor terminated four hours afterward with the birth of a dead child. For some days after labor the urine was bloody, but otherwise the patient's convalescence was uncomplicated.

The second patient returned to the hospital two weeks before the termination of pregnancy, and one year and seven months after the extraperitoneal section. The patient had pain in the scar during the early months of her pregnancy, which became better at about the fourth month. Labor began with weak uterine contractions and rupture of the membranes, the child being in breech presentation above the pelvis. As the uterine contractions were inefficient, operation was again performed by longitudinal section. A living child was readily extracted, followed by the placenta, the uterus tamponed, and the tampon brought through the cervix into the vagina. The uterine wound was closed with silk.

As the patient had requested it, both Fallopian tubes were resected. Mother and child made a good recovery. When discharged from the hospital, the uterus was midway between the symphysis and the umbilicus, drawn somewhat toward the right and the cervix toward the left.

In both cases, pregnancy proceeded without much disturbance, the first terminating one month before term.

Cholmogoroff¹ reports 22 vaginal Cesarean sections for various conditions, and urges the value of this operation. The series embraces 18 cases of normal pelvis, 3 of placenta prævia, others of eclampsia, nephritis, and conditions which made delivery otherwise impossible. Of the 22 patients, 5 mothers died, 1 of eclampsia, 1 of heart disease, and 3 of nephritis. These deaths can scarcely be ascribed to the operation.

Transperitoneal cervical section is advocated by Heinrichius.² He reports in detail 15 cases, 2 of stenosis of the cervical canal, 8 of pelvic contraction, 1 of threatened uterine rupture, 2 of contraction of the pelvis at the outlet, 1 of pelvic tumor, and 1 of eclampsia.

Operation was done at the beginning of labor and was preceded by an injection of ergotin. In 6 cases pituitrin was injected, without

¹ *Monatsschrift f. Geburtshülfe und Gynäkologie*, 1912, Band xxxvi, Heft 1.

² *Archiv. mensuelle d'Obstétrique*, May, 1912.

apparent results. There was 1 death, but autopsy failed to reveal the cause, and it was thought possibly to have occurred from some source of infection in the intestine.

The subject of extraperitoneal section is also treated by Costa,¹ who illustrated his paper by drawings showing the plan of operation.

Küstner² believes that extraperitoneal section is a useful operation, but does not share in the prevalent fear of wounding the peritoneum. He makes his incision as nearly as possible over the vertex of the fetal head. The muscular tissues are pushed aside and also the peritoneum, before the uterus is opened. Pituitrin is given to secure uterine contraction, and drainage with vioform gauze is considered important.

The indications, in his experience, have been contracted pelvis, overdistended cervix, and disproportion between mother and child.

He has also operated for prolapse of the umbilical cord. He operates when the mother is in a desperate condition, for in half the cases the classic section would have been declined. In 6 cases the bladder was wounded, but all recovered—a smaller percentage than after hebotomy. In clean cases, irritation of the intestine may follow, and irritation of the peritoneum shown in distention of the bowel with gas. Phlegmon did not develop in any of his patients.

The operation is not adapted to private houses and requires a good light and clinical facilities. Should the peritoneum be opened, drainage must be employed, and, if the peritoneum is badly damaged, the Porro operation should be done; or the operator may close the peritoneum, close the wound, and deliver the patient by craniotomy.

In 72 cases he had no maternal mortality, with the exception of 1 death from an anesthetic. Four children were stillborn, 1 of them in a case of eclampsia; 50 per cent. of these cases would have been declined with the classic section.

Bondy, in 25 extraperitoneal sections, examined the vaginal secretion and the amniotic liquid. In 2 of these cases the peritoneum was wounded; in 1 drainage was employed, 13 of the cases were probably infected, 7 had been previously examined, and 6 had fever. In 17 bacteria were found in the vaginal secretion, and in 8 bacteria were present in the amniotic liquid. In the clean cases they were present 7 times in the vaginal secretion, but not in the amniotic liquid.

Henkel reports 33 transperitoneal operations, with 1 death from placenta prævia, the patient apparently doing well for nineteen days, when she had been three days without fever and was allowed to get up. Phlegmon developed between the bladder and cervix, which caused peritonitis. The children were all born living.

In infected cases, he tampons the uterus with gauze, and uses anti-streptococcic serum.

¹ *Annali di Ostetricia*, 1912, No. 5.

² *Zentralblatt f. Gynäkologie*, 1912, No. 40.

EMBRYOTOMY

Cleidotomy. Liebich¹ reports 2 cases of cleidotomy.

The first was a primipara brought into the hospital with a lacerated perineum, and the head wedged tightly in the pelvis, the result of an unsuccessful attempt to deliver with forceps. The child was in the second position, and the shoulders seemed to be too large to pass through the pelvis. Accordingly, an arm was brought down, and while traction was made upon the hand, the left clavicle was cut through with blunt-pointed scissors. The dead child was 55 cm. in length.

The second case was that of an anencephalus, the head being delivered by manual extraction and the shoulders becoming impacted.

In this case, double cleidotomy was performed, followed by the introduction of a hook into the right axilla and the delivery of the shoulder.

The use of the blunt hook in embryotomy is an expedient not to be forgotten in cleidotomy and in decapitation. It is often exceedingly useful to bring down the shoulder and neck of the child by strong traction in an axilla with the blunt hook. The point of the hook should be buried deeply through the thoracic wall. In the hands of an experienced operator, this procedure is free from danger and renders the operation of decapitation comparatively easy and safe.

The Mammary Glands. Chirie² draws attention to *interesting points in the anatomy of the mammary glands*.

He has made special study of the glands in pregnancy, and finds that they share the general reaction of the organism in a very brief time after conception.

As regards the swelling of the mammary glands in the fetus and newborn, he believes that the same stimulus which produces this phenomenon in the mother is responsible for its appearance in the fetus. Substances passing from mother to fetus by means of the placenta produce this phenomenon.

His paper is illustrated by pictures of microscopic sections.

Adler³ contributes a paper upon *the internal secretion of the mammary glands*.

He reports the results of experiments upon animals, and illustrates his paper with tracings of curves used in the study of the circulation.

He finds that there exists some correlation between the suprarenals and the mammary glands, for when an extract of the mammary glands, whether that of the male subject, or virgin, or pregnant animal, is

¹ Zentralblatt f. Gynäkologie, 1912, No. 19.

² Archiv. mensuelle d'Obstétrique, October, 1912.

³ Monatsschrift f. Geburtshilfe und Gynäkologie, Festnumer, 1912.

injected into an animal, the suprarenals are markedly enlarged, becoming hyperemic, with extravasation of blood and mitosis. In the external portion, there is an increase in the cellular elements throughout the parenchyma.

An abnormal quantity of adrenalin substance is found in the blood serum of these animals. Sugar is also detected in the urine. When this substance is injected into the virginal or non-pregnant animal, it causes swelling of the uterine mucosa. The condition present is that called in the human subject hyperplastic glandular endometritis. The injection of this substance after the death of the fetus and its retention in the uterus is followed by the expulsion of the uterine contents. If injections be given shortly after conception, the development of the ovum is at once arrested, and, after a short time, no trace of the ovum can be found. When small quantities only are injected, conception seems to be delayed for a day or two. The general condition of the animal experimented upon was not altered by these injections.

The extract of glandular tissue seemed to work most potently when combined with physiological salt solution. Alcoholic solutions or suspensions seemed less potent when mammin had but a feeble influence. Extracts containing 96 per cent. of alcohol seemed to be efficient.

The influence of adrenalin upon the uterus seems to be that of a tonic, even when diluted to a considerable degree.

The Fetus and its Appendages. Ritter¹ reports a case of hematoma of the umbilical cord. The child was dead-born, of healthy parents, after normal pregnancy, and without trauma. The position was the second, the amniotic liquid apparently normal, and the cord was not about the neck. The heart-sounds ceased about an hour before labor.

As the head was born, it was observed that the lips were dark-bluish in color, and the conjunctiva swollen and dark-bluish. The child had evidently died just before delivery.

The placenta was delivered normally, the cord was 69 cm. long, and, at its placental extremity, normal. One centimeter from the abdominal wall of the fetus the cord was greatly altered over a portion 17 cm. long, in diameter 38 mm., and in circumference 64 mm.; it was dark-bluish in color, and toward the placenta again became normal. The cord had not undergone torsion and the placental substance was normal.

Upon examining the body of the child, the enlarged portion of the cord was a hematoma. No evidence of abnormality could be found in the vessels, and in the other portion the arteries were contracted, the veins collapsed, but the lumen of the veins was larger than normal.

¹ Zentralblatt f. Gynäkologie, 1912, No. 20.

Upon examining the site of the enlargement, the peripheral vessels seemed to be altered and ruptured. Blood had extravasated beneath the amnion, and, on microscopic examination, the veins were deficient in the development of elastic tissue.

Mellor¹ draws attention to the advantages of double ligation of the cord. The placenta seems to be loosened more quickly, as in the majority of cases it separates in from fifteen to twenty minutes after the cord is doubly tied.

Where single ligation was practised in the same length of time, a larger percentage of placentæ were separated, and after thirty minutes the percentage of placentæ still unseparated was less after single than after double ligation of the cord.

THE NEWBORN

The Premature Infant. Wyatt² contributes a paper on the *feeding of the premature infant*.

He believes that a mistake is usually made in giving the premature child, from the third to the seventh day of its existence, a very diluted mixture in quantities of from half an ounce to one ounce, every two hours. His custom has been to give the child, after the third day, equal parts of cows' milk and water containing cream lactose and sodium citrate. The quantity given varies. An ounce every two hours is tried, and this is gradually increased; but where this cannot be taken, from 4 to 6 drams are given, and this is gradually increased from 1 to 2 drams each day.

The food is prepared by taking equal quantities of milk and water, and with each ounce of this mixture is added 10 minims of cream and half a dram of lactose. This is put into bottles, and the bottles into a special boiler in which the water is brought to the boiling point, and then allowed to cool. When the water is boiling, the temperature of the milk is 190° F., and twenty minutes later varies from 150° to 165° F. The bottle is then sealed, and, when required, one grain of sodium citrate to one ounce of milk is added, the nipple placed on the bottle, and the child fed directly from it.

He cites 8 cases in which this method was carried out successfully. It has the merit of simplicity, and is entitled to a further trial.

The *mortality of premature infants* and the relation of this mortality to the cause of premature birth, has been studied by Plachu.³

He believes that a weight of 1500 grams may be considered as an average weight of a feeble, premature child, and among 541 such

¹ Zentralblatt f. Gynäkologie, 1912, No. 29.

² Journal of Obstetrics and Gynecology of the British Empire, October, 1912.

³ Archiv mensuelle d'Obstétrique, January, 1912.

children there were 179 in whom some clinical condition of the mother seemed to be the probable cause of the premature birth of the child. He finds that syphilis and tuberculosis are among the most frequent causes.

He believes that in the case of syphilitic infants that syphilitic treatment, by the inunction of mercurial ointment and iodide of potassium, failed to greatly lessen fetal mortality. In 16 prematurely born children showing the characteristic lesions of syphilis in the skin, mucous membranes, or viscera, 11 died in the hospital or in the wards assigned to these infants. The fatal lesions were progressive failure of digestion or convulsions. The percentage of mortality was 68.

In the case of premature children born of tuberculous mothers, we find that the temperature is usually below normal at first, afterward rising nearly to normal. Such children are difficult to feed, and have a considerable mortality from disorders of the digestive organs, and bronchial catarrh, often terminating in bronchial pneumonia. The mortality in 41 cases was 6, or 14.6 per cent., 1 death being from tuberculosis itself, and 5 from bronchopneumonia, with disorders of the digestive organs.

When cases of premature birth not dependent upon the mother's condition were considered, he finds that twin pregnancy has a considerable influence. The temperature of the child in these cases was usually subnormal for a varying time, usually rising after the child had begun to gain in weight. There is no great variation of temperature—one- or two-tenths—during the entire day.

He also believes that feeding should be done every two hours, and that the mother's milk should be utilized, if possible.

The morbidity among these children is not excessively great, and arises frequently from epidemic diseases. The mortality in 47 cases was 42 per cent.

Among the children prematurely born after rupturing the membranes, in 13 cases there was no mortality; in 26 cases in which the membranes were ruptured artificially and prematurely during obstetric operations, there was no fetal mortality. In 24 cases in which the mother had heart disease and albuminuria, there was one death; while in 12 patients suffering from cancer, typhoid, epilepsy, pyelonephritis and other infections, there was no fetal death. Syphilis, with a death rate of 68 per cent., and tuberculosis with a fetal death rate of 14.6 per cent., are the important causes of mortality in premature children. The average death rate in the other conditions cited was 2.4 per cent.

Vogt¹ draws attention to *congenital defects in the cranial bones of the newborn*. He cites Kehrers's collection of 33 similar cases.

In the three cases which he reports from the Dresden clinic, a wound

¹ Monatsschrift f. Geburtshülfe und Gynäkologie, 1913, Band xxxvii, Heft 1.

of the cranium seems to have been the initial cause of the defect in development. This had occasioned scar tissue, which prevented the formation of normal bone.

There is no satisfactory explanation for the injury, usually because an inflammation of the amnion cannot be disputed.

Meyer¹ draws attention to *abnormalities in the cranium of the newborn*. He finds bony material in the posterior fontanelles in a considerable number of cases, and quotes from the extensive literature of the subject. In all, he reports 6 cases where in the posterior fontanelle there occurred abnormal bony development at the posterior fontanelle.

These small bones were sometimes rhomboidal in shape, at other times three-cornered or triangular.

In the anterior fontanelle, he finds variation in the size of the fontanelle and in the degree of ossification of the surrounding tissue. In the bones of the cranium itself, he describes a case of osteomalacia in a fetus born at eight months through imperfect osteogenesis. The cranial bones had developed so little that the head was softened, and the diameters could be obtained with great difficulty.

He also reports cases in which the membranes, placenta, or wall of the uterus had, in some manner, interfered with the development of the cranial bones, causing a defect and absence of tissue. Hydrocephalus is a familiar example, and he reports an unusual case produced by the tight coiling of the cord about the fetal neck.

The *development of the fetus* has been studied by Lutz,² who estimates the age of the fetus from the first day of the last menstruation, and finds that at thirty-two weeks the fetus averages 2050 grams in weight, 48 cm. in length, and 34 cm. in cranial circumference. At thirty-six weeks, the average weight is 2880 grams, length 52 cm., cranial circumference 35 cm. At forty weeks, the average weight is 3310 grams, length 54 cm., and cranial circumference 37 cm.

Congenital Stenosis of the Pylorus. Scudder³ contributes a paper upon this subject, stating concisely our present knowledge.

A pyloric tumor about the size of the terminal phalanx of a finger or thumb, oval in shape, smooth and firm like cartilage, was present. It had no adhesions. The lumen of the pylorus was narrowed. The mucous membrane was greatly hypertrophied, in longitudinal folds, which added to the narrowness. This condition resulted from hypertrophy of the circular muscle fibres of the pylorus. Muscular contraction did not cause or influence this tumor. The changes secondary to this condition are, thickened or dilated gastric wall, the dilated esophagus, the empty intestine, and the starved appearance of the infant.

¹ Archiv f. Gynäkologie, 1912, Band xevi, Heft 2.

² Zentralblatt f. Gynäkologie, 1912, No. 47.

³ Surgery, Gynecology, and Obstetrics, April, 1912.

The principal symptoms are the apparent good health of the infant at birth, followed by persistent obstructive vomiting, a tumor which can be palpated, and gastric peristalsis. The stools are constipated and like meconium, there is fulness at the epigastrium, and oppression in the abdomen, and the child continues to lose weight. Nothing helps the infant, and it gradually dies of starvation.

The mortality is high, and while some may reach young adult life, they are poorly nourished and underdeveloped.

It cannot be denied that there are cases of pyloric obstruction, due to spasm, without tumor. These occur in bottle-fed, excitable, and neurotic infants, the symptoms appearing several weeks after birth. The stools contain fecal matter.

The pyloric tumor is felt only when gastric contraction occurs. The vomiting is different from that of tumor, but some of these cases, although spasmodic, die from starvation. In desperate cases of spasm, surgical treatment may be necessary.

So far as treatment is concerned, the spasmodic cases are benefited by non-operative treatment. Some relapse and require surgical interference.

The mortality from expectant medical treatment in tumor cases and severe spasmodic cases, is estimated as between 80 and 90 per cent.

Experience shows that operation should not be postponed until it becomes a last resort. While it may be possible to tide some of these infants along for a year or two, they are badly nourished, often becoming rachitic and dwarfed. The marked improvement following operation is most significant, and indicates that surgical treatment is required.

Various operations have been done upon these patients—the Loreta operation, pyloroplasty, and posterior gastrojejunostomy. The majority of surgeons favor the last.

Studies by the *x*-ray show that it is not a so-called drainage operation. By intragastric pressure, the stomach contents are forced through artificial stoma as though the relaxed pylorus was normally present.

A further advantage of this operation lies in the absence of impairment of digestion. Analyses of the food, and feces, show that the operation does not materially change the ultimate disposition of fat, carbohydrates, and protein. The tumor often persists after the operation, but as the passage of food is unimpeded through the stomach, the presence of the tumor does not injure the patient.

The *x*-ray shows that the pyloric obstruction remains after the operation. In one case the tumor was seen and palpated at autopsy, six and one-half months after a successful operation, and the tumor had been present at the time of operation.

The mortality following operation is steadily decreasing. The first

operation was performed in 1898, and from this time to 1905, cases were operated upon as a last resort, with a mortality of 46.5 per cent. The mortality under medical treatment at this time was between 80 and 90 per cent.

From 1905 to 1911 the writer quotes three groups of cases: One group—10 in number—collected by Stillman, and operated upon by six different surgeons, with one death—a mortality of 10 per cent.

A second group of 9 operated upon by Richter, with 1 death—a mortality of 11.1 per cent.

Scudder's group of 14 cases, with 1 death—a mortality of 7 per cent., a total number of 33 cases, with 3 deaths—a mortality of 9 per cent.

This subject was brought to the attention of the reviewer during the past winter by a case to which he was called in consultation, in which the attending physician had diagnosed congenital stenosis of the pylorus, and considered immediate operation necessary.

Upon examining the mother, she was found to be ill-nourished, neurotic, and secreting excessively fat breast-milk. The infant was fairly nourished, but two days old, and nursing.

Upon careful examination, the stomach was distended, but no pyloric tumor could be isolated. Vomiting had persisted for the greater part of twenty-four hours. The material vomited was but partially decomposed fat breast-milk, intensely sour. The child's urine was highly concentrated, with uric acid crystals. By carefully collecting and examining the diapers, it was found that, although the first stools had been meconium, they were gradually changing to fecal matter. The child's general condition was fairly good.

The absence of pyloric tumor and the presence of acidosis with decomposition of excessively fat breast-milk, seemed to the consultant to raise a grave doubt as to the presence of congenital stenosis. It was accordingly agreed to delay for twelve hours, and to treat the child by irrigation of the stomach with hot solution of bicarbonate of sodium, artificial feeding, and lavage of the intestine. The mother's breasts were massaged and pumped, and she was given to understand that she would certainly be able to nurse the child.

At the end of twelve hours the gastric tumor had entirely disappeared, no pyloric tumor could be recognized, fecal matter was passing in increased quantity, and the child went on with artificial feeding successfully.

There can be no question of the correctness of Scudder's position in cases in which the condition is actually present. Prompt operation is the only justifiable treatment.

Intracranial Bleeding and Injuries. Waldstein¹ reports two cases of bleeding in the newborn into the ventricles of the brain.

¹ Zentralblatt f. Gynäkologie, 1912, No. 50.

The first occurred in an infant born after thirteen hours of labor, from a primiparous mother, without pelvic abnormality. The child was of average weight and growth, and the labor not especially difficult. On the second day after birth the child did not open the mouth, and tonic contraction of the muscles of the face developed. Spasmodic contraction of the extremities followed, and spasm of the diaphragm. The larger fontanelle was tense, and the child pale.

As the symptoms resembled tetanus, fluid was taken from the stump of the umbilical cord, and mice were inoculated with this fluid. The result was negative. Lumbar puncture was performed, which gave cerebrospinal fluid containing blood. Death occurred on the fifth day.

At autopsy, fluid blood was found in all the ventricles, which were greatly distended. The suprarenal bodies were also the site of hemorrhage. The lungs had not expanded normally. The umbilicus and its vessels were intact.

The second case occurred in a child of a multipara, with rachitic pelvis and premature rupture of the membranes, followed by labor lasting sixteen hours. The cranium was finally brought into the pelvis by pressure, the anterior parietal bone having presented during labor.

The position was the second. When the child was born, it was noticed that the right parietal bone had been strongly pressed under the left, and both were beneath the occipital bone. During the day following birth the child developed weakness, pallor, rapid breathing, a rather weak pulse with spasm of the extremities, trismus, and spasm of the glottis. The fontanelles were tense and the coronal suture upon the left side was wider than upon the right. The lids of the left eye could not be completely closed. The spasm was more pronounced upon the right side of the lower extremities than upon the left.

The child died on the sixth day with convulsions. At autopsy, a recent and extensive hemorrhage was found in the lateral ventricles, especially upon the left side. There was an area of suffusion on the parietal beneath the left parietal bone, and hemorrhagic erosion of the stomach.

Abels¹ draws attention to the *venous congestion in the cerebral sinuses*, occurring in asphyxia in the newborn, *as a frequent cause for intracranial bleeding during prolonged labor*. Pressure upon the cranial sinuses, and the veins of the meninges, by the pressure of a parietal bone under the opposite bone, tends to produce this result. Hemorrhage into the connective tissue of the pia mater is often seen in these cases, with the formation of subdural hematoma. Tentorial bleeding is also recognized as a frequent form of intracranial hemorrhage.

Where the superior longitudinal sinus is injured, the bleeding is supratentorial, and where the lower sinuses are ruptured or partially torn, the bleeding is intratentorial.

¹ Archiv f. Gynäkologie, 1913, Band xcix, Heft 1.

Pelvic contraction, rigidity of the birth canal in the mother, prolonged labor, asphyxia of the infant, and the unskilful use of forceps, all tend to produce this injury.

Abel's first case was that of a healthy primipara, with a capacious pelvis, delivered of a somewhat premature child after thirteen hours' labor.

This illustrates premature birth as a cause for hemorrhage.

The second case was a prolonged labor in a multipara with a moderately contracted pelvis. Both cases developed typical symptoms, and autopsy confirmed the diagnosis.

The point that hemorrhage frequently occurs without external wound or lesion is emphasized, and the fact that these cases are not seen often after difficult labor artificially terminated, but in many cases after normal and apparently rapid labor.

Benthin¹ reports 10 cases of intracranial hemorrhage in the newborn, following compression and injury to the tentorium.

The first infant was born after twenty-six and one-half hours of labor through a flat, rachitic pelvis, two and one-half hours after the rupture of the membranes. The birth was spontaneous, with normal mechanism. The heart sounds were good and the child did not inspire foreign material into the lungs during labor. Death occurred shortly after birth.

The second case was spontaneous, rapid labor of four and one-half hours, the mother having eclampsia, and receiving medicinal and expectant treatment. Although the heart sounds were good, the child died an hour after labor from intracranial bleeding and laceration of the tentorium.

The third case was one of twins, dying during the stage of dilatation, although the position and presentation were normal.

In the fourth case the birth was rapid, the child dying three days after labor in convulsions. The fifth case was an easy forceps extraction, the head standing transversely but low in the pelvis, terminating in long labor. The child died apparently from asphyxia twenty minutes after birth, and autopsy showed lacerations of the tentorium and hemorrhage. In the sixth case, pituitrin was given because labor was prolonged and the heart sounds were becoming weak. Thirteen minutes after the injection of pituitrin, spontaneous birth occurred, followed by the death of the child from laceration of the tentorium and bleeding. In the seventh case, there was difficult labor in a primipara, with flat rachitic pelvis. There was depression of the left parietal bone, the bones were displaced under each other, and the child was asphyxiated.

In the eighth case, the child died two and one-half hours after an apparently normal labor with symptoms of asphyxia and with convulsions. There was depression in the left parietal bone, which was

¹ *Monatsschrift f. Geburtshülfe und Gynäkologie*, 1912, Band xxxvi, Heft 3.

crowded beneath the right. Injury to the tentorium on the right side resulted.

In the ninth case, the mother had eclampsia, and perished before the pains had become strong and active.

In the tenth case, the child was stillborn, with prolapsed cord.

There seems to be a greater disposition to laceration on the right than on the left side, and injury usually developed anteroposteriorly.

It is thought that an improper method of protecting the pelvic floor by making strong pressure upon the perineum may have some influence in the production of this accident.

In regard to its frequency, Beneke, in 100 sections on newborn infants, found the tentorium wounded in 14; Leopold Meier in 1200 labors, with 64 infant deaths, found the tentorium ruptured in 28; Benthin, in 1239 labors, had 107 infant deaths during the first days of life.

Eighty autopsies were obtained. Some of the cases coming to section had been those of embryotomy, and there remained 73 in which this operation had not been performed. Among the 73, were 8 cases of laceration of the tentorium—a mortality from this cause of practically 10 per cent.

Benthin draws especial attention to the fact that pressure upon the pelvic floor and perineum may produce this accident.

Bauereisen¹ reports a series of cases of rupture of the tentorium occurring in children delivered by some operation through the vagina. Intrameningeal bleeding accompanied the accident, and, in some cases, there was wounding of the sinuses as well. In many cases he believes that death does not follow this accident, but that abnormal conditions of the brain may develop later as a result.

Von Herff² reports the case of a primipara with contracted pelvis and premature rupture of the membranes followed by weak uterine contractions. There was some increase in the pulse and temperature, the head remained movable at the pelvic brim, without descent. The child's heart sounds were moderately strong but normal in frequency.

The child was delivered by section by the suprasymphyseal operation. The head was delivered easily with forceps, and it was noticeable that no force whatever was required in its extraction. Heart sounds were present at the time of delivery, but the cord was coiled tightly about the neck. The mother recovered.

The child could not be revived, and died soon after labor. It was 54 cm. long, weighed 3300 grams, and the circumference of the head, which was very hard, 35 cm. The mark of the cord could be seen about the neck. The head was cyanotic and dark in color. The remainder of the body was pale. On the left parietal bone there were evidences

¹ *Monatsschrift f. Geburtshülfe und Gynäkologie*, 1912, Band xxxv, Heft 4.

² *Zentralblatt f. Gynäkologie*, 1912, No. 38.

of birth pressure; on some of the other cranial bones there were extravasations.

At autopsy the superior longitudinal sinus was distended with fluid blood, and also the sinuses at the base of the brain. There was no bleeding at the cranial base, but the meninges were suffused. The tentorium cerebelli had been extensively lacerated, especially on the left side. The brain substance was normal.

Meyer and Hauch¹ contribute an illustrated paper upon *rupture of the cranial dura mater in the newborn*.

At autopsy they observed that the tension upon the membranes was greatly increased by pressure from before backward, and that such pressure must frequently have been present in marked degree in cases where this accident occurred. The fibers of the membranes in their various divisions were seen to be made tense by such pressure.

They also describe their method of performing an autopsy so as to recognize accurately this accident.

The material for this paper was 28 cases in the hospital at Copenhagen occurring among 64 deaths in the newborn in 1200 confinements. In some of these patients, rupture of the membranes seemed to have been the cause of death in 12 cases, or in 1 per cent. in 1200 confinements. The severity of the hemorrhage accompanying this accident depends somewhat upon whether both meningeal surfaces are wounded by the accident. They find that among the spontaneous labors—1100 in number—that the meninges were ruptured in 8 cases; 5 of these were slight in character, while 3 were grave; and in this series occurred 2 deaths as a result.

In 47 deliveries by breech extraction, rupture of the dura mater occurred in 11 cases, 3 of which were not severe, and 8 were grave. There were 5 deaths in this series. In 66 forceps operations, 8 injuries to the dura mater occurred, 1 insignificant, and 7 grave, with 5 deaths. There was 1 case of decapitation with rupture of the dura mater, which was not extensive.

The cases are tabulated and the paper is complete and interesting. The illustrations, though not colored, are clear.

Bondy² reports the case of an infant with *cephalhematoma* on the left parietal bone.

The interesting point in connection with the case was the fact that, by pressure, this could be entirely reduced. The mother was a multipara, delivered by forceps three weeks previously, the head remaining for twelve hours visible throughout. Rotation had occurred and labor pains were good. The head was delivered without difficulty by forceps, and the child was not asphyxiated.

A cranial tumor was present on the first day, but gradually became

¹ Archiv mensuelle d'Obstétrique, March, 1912.

² Monatsschrift f. Geburtshülfe und Gynäkologie, 1912, Band xxxv, Heft 4.

smaller, and on the following day was again of the original size. It was found that it could be replaced and that it evidently was a tumor, both external and internal. The bony substance had been injured by pressure. The child developed normally and seemed in no way the worse for the abnormality.

Soli¹ contributes an interesting paper upon the *surgical treatment of cranial depression in the newborn*. He reviews the work of previous operators, and describes Vicarelli's method, which he had himself employed.

This consists in cutting through the scalp and periosteum, and in using Heines' gimlet elevator, which is carried cautiously into the bony substance and by which traction is made.

He reports 3 cases successfully operated upon in this manner, and tabulates 20—11 operated upon by Vicarelli with success. In the series of 20 cases, there occurred but 2 deaths.

This instrument has a stem terminating in a short gimlet tip, while upon the other extremity the stem is bent transversely, its end terminating in another tip like the first.

That *meningitis* can develop in the newborn following purulent inflammation of the middle ear, is demonstrated by Bonhoff and Esch,² from the Marburg clinic.

The mother of the infant was a primipara, aged nineteen years, and the child was at full term and of average weight. The mother was healthy, and labor lasted eleven hours. The puerperal period was normal. The child's birth occurred with normal mechanism, but the child was born asphyxiated. In resuscitating it, the tracheal catheter was employed, and warm baths with cold sponging. During the first four days of life, the child was restless and cried abnormally. It did not nurse the mother, but swallowed teaspoonfuls of the mother's milk without difficulty. From the fifth day it became more quiet, but developed a very irritable condition of the muscles of the upper and lower extremities, and short clonic spasm in the muscles of the face, which extended to the extremities. The child emaciated rapidly. On the sixth day of life, the muscles of the back were abnormally sensitive, the eyelids remained open, and the pupils were widely dilated. The temperature was normal, there was paresis of the left facial nerve, and the fontanelles were tense during muscular spasm. It was thought that tentorial bleeding was present from birth pressure, the blood being above the tentorium. Lumbar puncture was made, and 3 c.c. of cerebrospinal fluid was extracted. It was cloudy, containing polynuclear leukocytes. There were no bacteria and no red blood cells present.

Although the result of the examination was not typical, it was thought to indicate an inflammatory process, and not hemorrhage.

¹ Archiv f. Gynäkologie, 1912, Band xcvii, Heft 2.

² Zeitschrift f. Geburtshilfe und Gynäkologie, 1912, Band lxx, Heft 3.

On the ninth day, tonic spasms had increased very markedly. The temperature began to rise and was somewhat elevated when death occurred five days later.

At autopsy it was found that old hemorrhage was present at the junction of the frontal bone and the anterior portion of the parietal bones. The dura mater was strongly injected, but contained no pus. The pia mater was tense. The entire convexity of the brain, especially upon the right side, was covered by a thick, purulent, and fibrinous mass. When the brain was removed, it was found that the purulent process had proceeded to the anterior brain along the olfactory nerves and optic tract of the base of the brain. The medulla was also covered with a purulent material, and both lobes of the cerebellum. The tentorium had not been ruptured, and, upon examining the ventricles, pus was found in both the right and left. The spinal cord in the region of the neck and thorax was also covered with purulent material. This process was traced to the right ear where the middle ear was the site of extensive suppuration. The bones of the ear were free in the purulent mass, and the right tympanum had perforated. No discharge from the ear had been observed during life.

On further study, it was found that this had not been a streptococcus infection. An effort was made to identify the bacteria obtained from the pus, and it was thought to be the *Bacillus mucosus capsulatus*.

Infections and Injuries to the Eyes of the Newborn. Lequex¹ believes that a relation exists between complicated labor and injuries to the eyes of the newborn. He cites Wolff's report of 29 cases of retinal hemorrhage among 281 infants.

He had examined 151 infants in the Tarnier clinic and in other hospitals, and had found injury or lesion in the eyes in 37 cases. There were paralysis, corneal lesions, or retinal lesions.

In the paralyzes, all but one were of the seventh pair of cranial nerves, and the history showed the high application of forceps in difficult and prolonged labor with oblique application of the blades, one blade upon the mastoid region of the head, the other on the frontal. Paralyzes were more frequent in those cases in which there was a lack of the normal lateral inclination of the head.

In 2 cases the paralysis of the seventh pair of nerves was associated with a similar condition in the sixth pair. In 1 there was a paralysis of the seventh; in 1, of the sixth only; and, in 1, of the brachial plexus as well.

Lesions of the cornea consist largely of opacity in varying degrees, often brief in duration, at other times developing slowly, and persisting for weeks or months. This has been styled by some traumatic keratitis, and has been reproduced experimentally in animals. De Wecker

¹ Archiv mensuelle d'Obstétrique, February, 1912.

observed it after the application of forceps. The duration of the lesion is variable—from four to eight days.

The writer saw it in 6 out of 151 infants, or 3.9 per cent. In 5 of these, the eyes colored up on the second or third day. In 1, the lesion was very pronounced.

In the 6 cases observed, the forceps had been used three times, or in 50 per cent. In 1 case it could not be proved that the eye had been contused by the forceps blades. Two of these infants were premature.

He draws attention to the fact that while contusion is usually present, the condition may result from what he styles indirect contusion or general pressure upon the cranium. The pathology of the lesion is obscure, and increased ocular tension seems to be present in many cases. The cornea becomes infiltrated from before backward in some cases, and from behind forward in others. It is supposed by some to depend upon injury to Descemet's membrane. Some cases recover spontaneously.

In this connection the reviewer would cite the case of an infant delivered by the Porro operation after the attending physician had unsuccessfully attempted to deliver with forceps in the patient's house. Considerable force must have been employed, for the head was badly bruised and severely compressed. The forceps blades had so bruised the affected eye that it was impossible to tell for some time what injury had been done.

On the recovery of the mother, the infant was seen by two ophthalmologists, who found that the cornea had become completely opaque, and that the deeper tissues of the eye had also been ruined. The removal of the eye subsequently became necessary.

Retinal hemorrhage is one of the most important lesions occurring in the eyes of the newborn. The writer cites statistics upon this point, which show great variation in the frequency of the lesion as reported by different authors. Thus, von Hippel states that it occurs in 42 per cent. of cases. Others give its frequency as not more than from 3 to 10 per cent.

The writer observed it in 10 per cent. of his cases. It may be unilateral or bilateral, and occurs in two principal forms, either deeply or more superficially. It is usually observed in flakes or spots about the optic nerve, and, when the hemorrhage is deep, the extravasation of blood is circumscribed and rounded in form. In some the blood is between the retina and the vitreous body, while in other cases the blood makes its way into the vitreous. In the majority of patients this condition clears up in eight days, leaving in place of the hemorrhage small areas of atrophy in the form of white cicatrices or plaques. These usually disappear in well-nourished children quite rapidly. The writer has not traced this condition directly to contusion, but he believes that indirect pressure and contusion is a most frequent cause.

Compression of the cranium by forceps can often be traced as the exciting cause.

The writer observed but 12 out of 100 cases in which the forceps could be blamed for the accident. In presentation of the breech or shoulder, followed by version, hemorrhage into the eye is quite frequent. This is explained by the fact that the child is usually born through a partly dilated birth canal, whose pressure makes congestion of the upper centres of the nervous system by reflux of blood from below upward as the limbs and breech descend.

In addition to ocular hemorrhage, cerebral hemorrhage and pulmonary apoplexy are not rare, following delivery in breech presentation. In the adult, compression of the thorax causes retinal hemorrhage, and observation has shown that in severe accidents where the chest is greatly compressed, this complication develops. Some insist, however, that the pressure which brings about ocular hemorrhage is caused by the hand of the obstetrician making pressure along the side of the thorax in the attempt to reach and bring down the fetal arms.

In the series of cases studied, retinal hemorrhage occurred in delivery by the breech, with or without version, in 14 per cent., which is a slight increase in frequency over presentation of the vertex. Face presentation also offers an opportunity for increased pressure followed by ocular hemorrhage. In general, there seems to be little difference in the frequency of this complication between cases where birth is spontaneous and where delivery is effected by some operation performed through the vagina.

Although it has been thought that this accident is more frequent in primiparæ, the writer's statistics do not prove this, for in the 15 cases there were 8 primiparæ and 7 multiparæ.

Contracted pelvis is not always responsible for the condition, as the pelvis was normal in 12, and contracted in 3 of the 15 cases. The size and weight of the child does not seem to be an important element, for in 10 per cent. of the cases the child weighed less than 2000 grams; in 90 per cent., more than 2000 grams. Premature development favors the complication, because the tissues are less resistant to pressure.

The important factors in producing this condition are prolonged labor with contusion of the fetal head, or pressure through contact with the pelvis. Compression is undoubtedly the most important element, and the greater pressure is sustained by that portion of the fetal head which is most to the front. The anterior eye is the one most often affected.

Although this is the opinion of the majority, the writer finds no difference between the anterior and posterior eyes.

In 12 per cent. of the cases, asphyxia was present as a complication. The writer thinks that twins developed from one ovum are especially

predisposed to the accident because of the conditions of the circulation present. On the side of the mother, albuminuria and syphilis predispose to this complication in the fetus. Six infants with hereditary syphilis had retinal hemorrhage, and if the infants were uniformly tested by the Wassermann reaction, it is probable that a greater number in proportion would be found.

He concludes from his study of these cases that direct pressure is not so much the cause of the accident as increase in intracranial stasis. Papillary stasis is produced by the engorgement of the cranial contents of the cerebrospinal fluid, which increases the pressure in the sheath of the optic nerve. Venous stasis is present in traumatic cases where the veins of the septum are engorged through direct pressure. The fact that the ophthalmic vein is a tributary to the facial vein explains the frequency of venous stasis along the border of the retina. In 5 per cent. of cases this was distinctly perceptible, and is undoubtedly the first stage in the formation of retinal hemorrhage.

The pathological condition which makes the vessels unusually friable, as in premature and syphilitic children, greatly predisposes to the development of hemorrhage. Fournier's observation that pigmentary retinitis is often seen in syphilitic infants, is an illustration of the conditions here described.

SUPPURATION IN THE EYES OF THE NEWBORN. Zweifel¹ contributes an article upon the effect of different substances used in the eyes of the newborn to prevent ophthalmia. He illustrates his paper by microscopic photographs of the cornea, after silver nitrate, silver acetate, protargol, and other preparations of silver have been employed. For twelve years he has recommended the acetate of silver instead of the nitrate, followed by dilute salt solution or boiled water, as the simplest and safest method for preventing ophthalmia. He recommends acetate of silver because at an air temperature of 10° to 20° C., not more than 1 per cent. of the salt is dissolved, the solution never becoming concentrated sufficiently to cause irritation. This substance has been used under his observation by midwives in 5222 infants.

Among these, suppurative inflammation in the eyes occurred in varying degrees in 0.23 per cent., while with the nitrate of silver solution, the irritation and inflammation were observed in 0.62 per cent.

The advice to use dilute salt solution as an underlying material is the result of observation, as it was found that less irritation arises by this method than when distilled water only is employed.

When an incorrect diagnosis of ophthalmia is made through faulty microscopic technique, the repeated use of silver as a disinfectant may cause silver catarrh, which may be followed by permanent scarring of the cornea. This, however, may happen after a single application of 2 per cent. nitrate of silver.

¹ Zentralblatt f. Gynäkologie, 1912, No. 27.

Regarding sophol, which is recommended by von Herff, it is undoubtedly in solutions of 5 and 10 per cent. less irritating than silver nitrate, but is more apt to cause inflammation than acetate of silver.

In 1060 children treated with this preparation in 5 per cent. solution, specific ophthalmia developed twice in both eyes, or 0.18 per cent. There were symptoms of irritation in 112 out of the 1060 children, 50 times in both eyes, 40 times in the left eye alone, in which acetate of silver had been used, and 22 times in the right eye alone, in which sophol was used.

The objection against sophol and protargol may be raised that neither is a permanent solution, that a precipitate forms from each, and that sophol has to be dissolved in warm distilled water.

So far as price is concerned, the preparations of silver vary considerably. Acetate of silver is twice as expensive as nitrate of silver, and sophol two and one-half times as expensive.

Ophthalmia in the Newborn is the subject of a paper by Tallant.¹ The material of the paper is 37 cases of ophthalmia neonatorum in 3325 births, in both hospital and operation practice; 4 of these cases are too transient to be of value, and 31 are sufficiently pronounced to deserve study. Of these, approximately 10 per cent. began before labor, 42 per cent. were primary, and 48 per cent. secondary.

A very marked difference was observed as regards diagnosis between laboratory bacteriological diagnosis and that based upon clinical observation only.

By the former, gonorrhea was present in 45 per cent. of the cases, but from clinical observation 81 per cent. were considered gonorrheal and were treated accordingly. There seemed to be no difference in the frequency of the infection between the two sexes.

Of the 31 cases, 21 mothers passed through the puerperal period without the slightest systemic disturbance, although gonococci were often obtained from the cervix, vagina, or urethra. Three had a slight reaction, the temperature rising but a few times above 100° F.; 7 had fever with abdominal or ovarian pain, characterized by gonococcus infection in the puerperal period. The three worst cases among the children were contracted from mothers having a very mild infection. The most severe condition seen in the mother sometimes produced no infection whatever in the child.

In the experience of the writer, there was no marked change in temperature in any of the infants which could be properly ascribed to the infection in the eyes, nor did the eye condition seem to influence the child's weight or development or general health to any great extent.

It is concluded from these observations that there is no reason to separate the child from the mother, even if the mother be diseased,

¹ American Journal of Obstetrics, November, 1912.

since her milk is not affected and infants thrive much better with breast-fed milk. If the mother be particularly ignorant or unclean, it is well to remove the child to avoid the chance of continual re-infection.

As a prophylactic, 1 per cent. of silver nitrate solution was employed. In 2275 out-patient cases where nitrate of silver was used in prophylaxis, there were 8 cases of ophthalmia, or 0.35 of 1 per cent. Of these 4 were from gonorrheal infection.

In 950 hospital cases, ophthalmia occurred 27 times, or 2.84 per cent. This arose apparently from secondary infection, the primary prophylaxis not proving sufficient to secure immunity for a longer period than a few days.

This indicates that in hospitals greater care should be exercised to avoid secondary infection in infants. When this developed argyrol was used in the great number of cases, supplemented by silver nitrate, boric acid solution, hot or cold compressions, and atropine.

The results were, on the whole, satisfactory.

The question whether ophthalmia neonatorum has grown less frequent is considered by Hörder.¹ He quotes statistics of thirty German cities, giving the number of cases of blindness from ophthalmia. He also adds the cost which the illness of each patient has entailed. He finds that, in German asylums for the blind, 12.39 per cent. attributed their blindness to ophthalmia neonatorum. Each of these patients cost the State yearly 820 marks.

In the last twenty-seven years it is estimated that between \$2,000,000 and \$3,000,000 have been spent in the care of the blind whose vision was lost through ophthalmia. It is estimated that at one time 40 per cent. of children born in hospitals suffered from ophthalmia neonatorum. Then came the introduction of Créde's method, followed by great improvement.

In 1895, Cohn analyzed the statistics of 54 blind asylums, finding 13 per cent. from ophthalmia. The most recent statistics give 12.39 per cent. of blindness as the result of ophthalmia.

In carrying out Créde's method, Weidenbaum² has found it advantageous to use crystals of nitrate of silver and to make a 1 per cent. solution freshly for each application. This he brings about by having small pearls or pastiles of nitrate of silver in dark colored bottles, one to be added to a certain quantity of water for each application.

The merits of Zweifel's acetate of silver in place of nitrate of silver, are again studied by Schweitzer,³ assistant to Zweifel in his clinic in Leipsic.

He states again the points already made by Zweifel in the paper quoted, and describes the other preparations of silver commonly

¹ Zentralblatt f. Gynäkologie, 1912, No. 45.

² Ibid.

³ Archiv f. Gynäkologie, 1912, Band xcvii, Heft 1.

employed, including argentanin, argonin, protargol, collargol, argyrol, and sophol.

The last is a preparation of silver with formaldehyde and nuclein, containing 20 per cent. of metallic silver. It is used in 5 and 10 per cent. solutions, freshly made, and does not affect the connective tissues of the cornea. Argyrol, which is frequently used in America, is a vitellin or egg-albumen combination with silver, containing 30 per cent. of silver. This is used in solutions of 10 and 20 per cent.

Statistics show that nitrate of silver produces irritation far more frequently than any other preparation. Acetate of silver and sophol seem the least irritating. According to von Herff, argyrol produces no irritation.

The article is illustrated by microscopic pictures showing the effects of the different preparations upon the cornea.

The reviewer's experience is decidedly in favor of argyrol. We are accustomed to use it upon clinical evidence only, not making cultures unless a definite inflammation of the eyes develops. All mothers receive a preliminary vaginal douche of lysol, 1 per cent., and tincture of green soap suds. Immediately after birth, argyrol is dropped into both eyes. If the mother has been apparently clean at labor, 10 per cent. solution is used. If there is a suspicion that she has been unclean, 20 per cent. is employed. This is followed by flushing and cleansing with boric acid solution. In the nursery, boric acid is used daily in cleansing the eyes, and argyrol is not again used unless symptoms of inflammation develop. A culture is then made, but argyrol is employed independently of the culture and without waiting for the report from the laboratory. Cold compresses taken from a cake of ice are used in proportion to the severity of the inflammation. Each child has its separate crib at all times, and if the case is proved by clinical course and laboratory examination to be actively gonorrheal, it is transferred to a separate room for a short time.

In more than 1000 cases we have had no severe ophthalmia. Infants so infected are not separated from the mother, but the mother is instructed not to touch the infant's eyes, nor to put the infant to her own face—an instruction which is seldom obeyed in the absence of the nurse.

No specific ophthalmia in the mother has yet developed, nor has ophthalmia in the infant been accompanied by fever or morbidity during the puerperal period. Slight catarrhal conjunctivitis is not uncommon, and sometimes accompanies influenza among mothers or nurses.

Before using argyrol we used silver nitrate, with much less satisfactory results.

DISEASES OF THE NERVOUS SYSTEM

By WILLIAM G. SPILLER, M.D.

DISEASES OF THE BRAIN

Brain Tumor.—An important study has been made by H. H. Tooth¹ of the history, progress, treatment, fate, and, in many cases, post-mortem findings of persons afflicted with intracranial tumors who have come under observation at the National Hospital in London during the period of ten years, 1902 to 1911 inclusive. During this period there have been 566 cases in the hospital diagnosticated as brain tumor. After rejection of some cases, 500 are left as "practically certain" cases of tumor, and, from these, conclusions are drawn. One case, to which Tooth refers in detail, is an interesting example of pseudotumor. A woman who, nineteen years previously, had had severe convulsions, five months previously posterior headache, five weeks previously a Jacksonian convulsion in the left hand and arm preceded by an aura in the same situation, on admission presented the symptoms of right precentral tumor, viz., mental levity, intense optic neuritis, blurred vision, left hemiplegia, and exaggerated left deep reflexes. The brain was explored by Horsley over the region indicated and nothing was found. No tumor was found at necropsy, but there was great general rise of intracranial pressure, sufficient to force the posterior part of the cerebellar lobes into the foramen magnum. A careful examination of the brain failed to reveal any cause for the symptoms. Tooth thinks this may not be a rare case, and it is like other cases which experienced neurologists will recall, in which diagnosis between tumor and some other lesion simulating tumor has caused great perplexity.

Tooth's statistics show that the two most frequent seats of tumor are the frontal region and the cerebellum. If the frontal and parietal lobes are considered together, and the cerebellum and pons, it is remarkable how closely in vulnerability these two antipodal regions correspond, *i. e.*, frontoparietal cases numbered 163, pontocerebellar, 160, making together more than half of all growths. Figures as to the ages at which tumors appear are more or less unreliable, because in some instances tumor may be latent a long time or the diagnosis may

¹ Proceedings of the Royal Society of Medicine, Neurological Section, October, 31, 1912, p. 1.

be made sooner by one man than another, but it is worth while to record that Tooth finds tumors of the forebrain tend to appear more frequently in middle age, but no age is exempt. Those of the mid-brain appear first predominantly in the early or adolescent period, and the same may be said of the cerebellum and pons; comparatively few occur after thirty years.

It is not surprising to find the statement that glioma is the most common form of tumor; in Tooth's cases forming 49.2 per cent. This is in agreement with general experience. In regard to the frequency of other tumors, so much difference of opinion exists as to what shall be called sarcoma, endothelioma, and fibroma that statistics are unreliable.

Heredity, in Tooth's opinion, is practically a negligible factor as regards brain tumor.

Simple cyst is especially interesting because it offers the best opportunity for surgical intervention, but we know that most cysts are in relation with tumor. Tooth found only 5 simple cysts in the large collection. All were thin-walled, apparently structureless bags containing clear fluid. The percentage was 1.9.

An important part of Tooth's work is the determination of the *duration of tumor without operation*. If the 22 gliomas of the forebrain are considered, the survival was from six weeks to nine years, but only one case had so long a period, and it is therefore rejected. The average period then is ten and one-tenth months. The survival period for the frontal region is the longest; the temporosphenoidal comes next with fewer figures, and the corona radiata last with still fewer. The central and occipital cases are too few to consider separately. The shortest survival period in tumor of the midbrain, pons-cerebellum, and base of the brain was twenty-four days, a glioma of the pons; and the longest was two years, also a tumor of the pons. The average survival period was nine and four-tenths months, not much less than that for the forebrain. Endothelioma gives a better prognosis. The average survival period in Tooth's cases seems to be four years, and probably this figure errs on the side of underestimation. The average survival period of tumor of the pituitary body in his cases is seven and one-half years.

CONGENITAL BRAIN TUMOR. The literature on tumor of the brain is very extensive, but little is known concerning congenital tumor. Oppenheim¹ has given us recently an excellent paper on this subject and although none of his cases was with necropsy, he has made the existence of congenital tumor probable. His first case is as follows: The patient was a man, aged twenty-six years, who was supposed to have had left hemianopsia since birth. At the age of nineteen years he had

¹ Neurologisches Centralblatt, January 2, 1913, p. 3.

severe pain in the right side of the head, and paresthesia and weakness of the entire left side of the body. These symptoms were accompanied by vomiting. The headache lasted fourteen days, the left-sided weakness diminished so that walking became possible, and the left upper limb was used, although not in a normal manner. In other respects the man was in good health. When aged twenty-five years, he had again severe headache and vomiting lasting about fourteen days, but these symptoms disappeared and he remained well for a year. On October 11, 1912, headache again became severe, and was associated with paresthesia and paralysis of the left side. Left-sided hemianopic pupillary rigidity was now determined. Oppenheim diagnosed a lesion of the right optic thalamus and primary visual centres, because of the left hemiparesis, left hemiataxia, and hemianesthesia, left hemianopsia and hemianopic pupillary rigidity and central pain, by which seems to be meant the right-sided headache. He believes the lesion was a tumor, congenital in origin, and having little tendency to growth, probably a cavernous angioma. He reports 3 other cases which are not quite so striking as the first.

In his monograph on brain tumor, he stated that certain tumor formations of the brain are to be regarded as congenital, such as dermoid cysts, teratoma of the hypophysis, angioma, and possibly choletomatoma and neuroma of the cranial nerves. These tumors may produce symptoms from some exciting cause in childhood, and then become latent, or the symptoms may first appear in adult age. Symptoms of increased intracranial pressure are not conspicuous with angioma, and angioma of the brain may be associated with vascular tumors in other parts of the body, as angioma or telangiectasia of the face or scalp. Angioma of the brain is a rare tumor and Oppenheim says he has only twice confirmed his diagnosis of this tumor by biopsy or necropsy, although he has found angioma a few times at operation. A superficial angioma is a great help in the diagnosis.

I think it well in this connection to say a word or two concerning glioma, to which Oppenheim makes no reference in his paper. It is probable that glioma in some instances may exist many years without causing symptoms, and may be of comparatively slow growth. There would be danger in such a case of mistaking an acquired glioma for a congenital tumor; and indeed it is not impossible that a glioma may be congenital or at least be the end-result of abnormally formed neuroglia.

Lafora,¹ from his experience with angioma of the brain, thinks it is not as rare a tumor as it is regarded by some. It is usually a circumscribed tumor with cavernous dilatations of its vessels (*angioma cavernosum circumscriptum*), although there is another variety of

¹ New York Medical Journal, November 16, 1912, p. 1007.

diffuse angioma (angioma racemosum), usually arising from the pia. Angioma of the pons he thinks is very rare, judging from the few cases yet reported. In my experience angioma anywhere in the brain is rare. Lafora has reported two cases of angioma of the pons. In his recent paper he describes the case of a young woman, who, after a dissolute life, became highly excited, impulsive, and violent. Later, projectile vomiting, fever, pupillary rigidity with probable preservation of the eye movements, and slight convulsions were observed. The patient died from exhaustion after a month's illness. At the necropsy an angioma of about 8 mm. in diameter was found in the pons, lying in the raphe, and involving the substantia reticularis of the tegmental portion of the posterior part of the nucleus pontis and of the ventral portion of the pons. The lesion to the unaided eye appeared to be that of the hemorrhagic polioencephalitis of Wernicke, of the form termed inferior, in which the punctiform hemorrhages take place in the gray matter of the pons and medulla oblongata, affecting only slightly the nucleus of the third nerve. The histological examination showed that the process was not a hemorrhagic one, but an angioma of the pons.

Lafora believes angiomas probably exist from birth, but the vessels are not so widely dilated as at the epoch of the occurrence of the symptoms. Later in life the tumor, becoming enlarged, gives rise to symptoms, so soon as compression of important structures is produced. The reason why in some people no symptoms are detected until senility, while in others they appear at puberty, depends probably upon the mode of living and the temperament of the patient (alcoholism, etc.).

HYPERNEPHROMA OF BRAIN. The case of brain tumor reported by Collins and Armour¹ is important because it was a hypernephroma, a metastasis from a large tumor of the abdomen. These authors state that the most common place for these secondary tumors is bone, and many statistics regarding hypernephromas record only one or two instances of metastasis to the brain. The tumor caused focal symptoms, but the general symptoms of brain tumor were absent; this is not an uncommon occurrence when a tumor is small, and may be even when the tumor is of considerable size.

ARTERIOSCLEROSIS SIMULATING BRAIN TUMOR. Arteriosclerosis seldom causes symptoms resembling those of brain tumor, and it is therefore with surprise we read that in an observation by Bonhoeffer² a mistake in diagnosis in a case of arteriosclerosis was made. The diagnosis of paretic dementia was considered at first and then abandoned. Arteriosclerosis was thought of but more as a condition associated with tumor, which was supposed to be in the left frontal lobe

¹ American Journal of the Medical Sciences, November, 1912, p. 726.

² Monatsschrift f. Psychiatrie und Neurologie, November, 1912, p. 391.

because of agraphia, disturbance of speech, and weakness of the right hand. Optic neuritis of one diopter was found in the right eye, and hazy edges of the disk in the left eye, and those findings led to puncture of the brain over the frontal lobe. Blood was obtained and was supposed to be from a tumor, and an operation over the left frontal lobe was done. The necropsy showed only arteriosclerosis and multiple areas of softening with some hemorrhages. The case is important as showing optic neuritis from arteriosclerosis of the brain.

HYDROCEPHALUS RESEMBLING TUMOR. Hydrocephalus often accompanies tumor, but occasionally it alone causes the symptoms of tumor, and the diagnosis may be very difficult. Such a case is reported by Couto.¹ A man had headache, vertigo, and vomiting. The left limbs became heavy and numb, and within a few days were paralyzed. The right oculomotor nerve became paralyzed, and the Weber symptom-complex was presented. The diagnosis of a rapidly developing tumor seemed justified. Lumbar puncture was performed, and while the cerebrospinal fluid was escaping the headache lessened. Several hours later the headache had ceased, and the man was able to sit up without vertigo and vomiting, he could make more use of his paralyzed left limbs, and on the following day improvement was very striking. A second lumbar puncture was made, and one month later the man left the hospital entirely recovered. The result of lumbar puncture justified the diagnosis of acquired hydrocephalus probably resulting from grippe. The case is interesting, as almost always symptoms of hydrocephalus indicate a general, and not a focal, lesion, but it may be that this was one of the rare cases of unilateral hydrocephalus. The recovery following lumbar puncture was no less remarkable, but Couto refers to two other cases with similar improvement. A boy, aged fourteen years, was brought to the hospital a few days after a head injury. He presented the symptoms of cerebellar tumor. The symptoms disappeared immediately after lumbar puncture. The other patient was a man with severe symptoms of cerebral tumor, but they all disappeared immediately after lumbar puncture and did not return. One must, however, be careful in using lumbar puncture, for it has caused death in cases of brain tumor.

CROSSED REFLEX IN BRAIN TUMOR. A peculiar reflex occurring in a case supposed to be one of cerebral tumor is reported by E. B. Gunson.² Upon grasping firmly the quadriceps extensor muscle with the thumb and fingers of one hand, immediate flexion at the contralateral hip-joint took place. The reflex was present equally on each side; no response was produced by stroking the skin of the thigh or by percussion of the muscles or bones. There was no movement at the hip-

¹ *Neurologisches Centralblatt*, January 2, 1913, p. 20.

² *Lancet*, August 3, 1912, p. 295.

joint on the ipsilateral side, but dorsiflexion of the great toe resulted on this side.

CEREBELLAR TUMOR. Complete recovery after removal of a cerebellar tumor is not so frequent as one could wish; too often the results of operation are unfavorable. A case recorded by Oppenheim¹ has some interesting features. The tumor occupied the vermis and extended into each lateral lobe, and had the appearance of glioma or psammoglioma. The extirpated mass was as large as the lateral lobe of the cerebellum of the child operated upon. When the boy was presented, over a year after the operation, he seemed to have no incoördination. The case demonstrated the variation of corneal reflex and nystagmus according as the patient changed his position. Oppenheim has emphasized that when a tumor develops in the cerebellum, nystagmus in the erect position may be slight or even absent, but may be more intense when the patient is lying on his side. When the tumor is right-sided and the patient is lying down and on his left side, nystagmus may be seen clearly in movements of the eyes to the right, whereas the nystagmus may disappear when the patient is lying on his right side. The same may be observed regarding the loss of palpebral reflex from irritation of the cornea, *i. e.*, the loss may be observed only when the patient is in the lateral position.

The removal of so much of the cerebellum including a large part of the vermis caused no persistent incoördination, and this to some extent may be explained by the age of the patient (twelve years), but is a remarkable observation.

It is important to know that the fourth ventricle may be opened during an operation on the brain without serious consequences, at least this is true of a case reported by Oppenheim and Krause.² The diagnosis of cerebellar tumor was made, and a tumor, plexiform lympho-angio-sarcoma, was found between the left cerebellar lobe and the vermis extending into the velum medullare posticum. It measured after extirpation 40 mm., from above downward, 25 mm. from before backward, and 30 mm. transversely. The fourth ventricle was widely opened. Krause thinks the favorable outcome of the operation depended on the fact that he replaced the cerebellar hemispheres over the fourth ventricle and completely closed the dura.

Oppenheim emphasizes the absence of those symptoms which are supposed to follow opening of the fourth ventricle. Neither immediately after the operation nor later were there respiratory or circulatory disturbances, the pulse seldom was as high as 100. The symptoms were made worse by the operation, but after a time improvement was marked and all objective signs of cerebellar disease vanished. It was

¹ Berliner klin. Wochenschrift, December 9, 1912, p. 2345.

² Ibid., 1913, No. 8.

extraordinary that this tumor implicating the vermis did not cause nystagmus and cerebellar incoördination. Oppenheim has observed three other cases in which the fourth ventricle had been opened by Krause, and in none were respiratory and circulatory disturbances and glycosuria observed.

Benedikt's Syndrome following Trauma. The occurrence of oculomotor palsy with tremor of the opposite side of the body as a result of injury is very rare, and Bychowski's¹ case with this complex is worthy of consideration. A girl, aged sixteen years, had a severe fall, and was unconscious. The right oculomotor nerve was paralyzed. A tremor of the left hand developed two weeks after the injury, and was perceptible only on active or passive movement. Benedikt's syndrome usually implies oculomotor palsy on one side, with palsy and tremor of the opposite side of the body, but Bychowski points out that while this was the condition in the first cases observed by Benedikt, in many cases, even in some with necropsy, palsy was slight or absent, and that tremor of one side and oculomotor palsy of the other are the essential features. Usually these symptoms are permanent and may be progressive, but in Bychowski's case improvement occurred. It is not unusual for the symptoms to develop at different times. The tremor has varied greatly in character in the reported cases. Bychowski believed that in his case a hemorrhage occurred in the cerebral peduncle and implicated the oculomotor nerve, later this hemorrhage produced softening about it, which in turn implicated the superior cerebellar peduncle. The improvement hardly justified this diagnosis and therefore he suggested also that the hemorrhage may have been upon the peduncle instead of within it. A similar case was reported by Charcot. Bychowski did not obtain a necropsy in his case.

Hemiplegia. DIPHTHERITIC HEMIPLEGIA. When symptoms of nervous disease occur following diphtheria, usually they indicate multiple neuritis, but that hemiplegia may develop is shown in a paper by J. D. Rolleston² with the report of a case. As Rolleston says, hemiplegia is a rare occurrence in diphtheria. Out of 9075 completed cases of diphtheria admitted to the Grove Fever Hospital between August, 1899, and September, 1912, only 6, including his own, developed hemiplegia. Four died and 2 recovered. A necropsy was held on one case, a boy, aged three years, in whom right hemiplegia and aphasia occurred on the fourteenth day and death on the seventeenth day. Cerebral embolism was found in this case. In the second case, a girl aged six years, right hemiplegia occurred on the twenty-ninth day, and was of only three hours' duration, being probably of uremic origin. In a third case, a girl aged three years, left hemiplegia occurred on

¹ *Zeitschrift f. die gesamte Neurologie und Psychiatrie*, 1913, vol. xiv, No. 3.

² Proceedings of the Royal Society of Medicine, Clinical Section, January 10, 1913, p. 69.

the eighteenth day of the disease, and was followed by embolism of the lower limbs the next day, when death occurred. Rolleston states there is now a total of 80 cases of diphtheritic hemiplegia on record. The majority of the cases occur in the first six weeks of the disease, the time of predilection being the end of the third or beginning of the fourth week. In all the cases in which details are given, the diphtheritic angina was severe, and in most cases ordinary diphtheritic paralysis preceded or followed the onset of hemiplegia.

Diphtheritic hemiplegia, Rolleston states, is usually of embolic origin; in 12 out of 18 necropsies, embolism has been found. Embolism probably is more common in diphtheria than in any other acute contagious disease, being due, as Marfan has shown, to apical endocarditis. The embolism may be found not only in the cerebral circulation, but in the kidneys, spleen, lungs, and even the abdominal aorta.

The prognosis in diphtheritic hemiplegia, as in hemiplegia generally following acute infections, is unfavorable in regard to complete recovery. There are only 4 cases on record in which diphtheritic hemiplegia entirely disappeared.

OPTIC ATROPHY WITH CONTRALATERAL HEMIPLEGIA. The combination of unilateral optic atrophy and contralateral hemiplegia is seldom encountered, and the symptom-complex is not well known, even though a certain number of cases have been described. Cadwalader¹ states that, with the exception of a brief reference in Starr's text-book, he has not been able to find any description of the condition in American literature. He therefore reports two cases. It has been shown by necropsy that an embolic mass can be carried through the internal carotid artery into the middle cerebral artery, producing apoplexy and hemiplegia; at the same time a portion can be swept into the ophthalmic artery as it branches from the internal carotid, or it may even be lodged in the central artery of the retina, and thus produce sudden blindness and atrophy. It is important to distinguish this symptom-complex caused by vascular lesion from that caused by tumor of the base of the frontal lobe, as described by Gowers, Horsley, and Kennedy. In the latter, the optic atrophy would not be likely to develop simultaneously with the hemiplegia, and yet this is not a positive sign, as in a case described by Batten and Guthrie optic atrophy probably was not completed for nearly three months after the initial apoplexy. A portion of the occluding mass in the internal carotid artery may subsequently be swept into the ophthalmic artery.

Aphasia in the Left-handed. A few cases have shown that in left-handed persons a lesion of the right cerebral hemisphere causes aphasia, and the case with necropsy reported by Dejerine and Thomas² is a valuable contribution to this subject. The disturbance of speech in

¹ Journal of the American Medical Association, December 21, 1913, p. 2248.

² Revue Neurologique, August 30, 1912, p. 213.

their case gradually diminished, and after four years the motor aphasia had almost disappeared. The impairment of writing was pronounced to the time of death. The primary lesions were strictly confined to the right hemisphere, as none were found in serial sections in the left hemisphere. Word deafness, if it existed, must have been of very short duration, as it was not present at the time of examination, almost a year after the onset of the aphasia. As the right temporal lobe was extensively damaged, it would seem that word deafness in left-handed persons depends on lesions different in character from those producing this symptom in right-handed persons. The recovery of speech is explained by the vicarious action of the left hemisphere. Such substitution is more likely to occur in left-handed persons, because they are taught to use their right hands for certain actions, as writing, and are therefore more nearly ambidextrous.

Congenital Spastic Paralysis. Some interesting anatomical findings of E. Lindon Mellus¹ have important clinical bearing. During an investigation of the so-called motor area in man he examined sections from that area in the brain of an eight months' fetus. He found the corona radiata of both central convolutions thickly sown with what appeared to be migrating cells. These cells were in various stages of development, the large majority resembling neuroblasts just leaving the matrix in earlier stages, but many were well advanced in development, the nucleus having a distinct nucleolus and being enveloped by a considerable cell body. Thus it appears that in man, Mellus says, even at the period of birth, all the constituent parts of the cerebral cortex are not only not *in situ*, but that the birth of new units is still going actively on, and that these elements are still moving from their place of origin in the ventricular wall to their ultimate destination in the cortex. Comparing the cells in the cortex of the newborn with those in the adult brain, Mellus concludes that no cell in the cerebral cortex is fully developed at birth.

All this has clinical bearing. A child born prematurely is often deficient in mental power, and weak and spastic in the limbs, especially in the lower. The cause has been supposed to be arrest in the medullation of nerve fibers, but Mellus' work seems to show that, in addition to this cause, premature birth may arrest the development of nerve cells, and this may be as important or even more so than arrest in the development of nerve fibers.

Brain Abscess. An interesting study has been made by Tylor² as to the paths of encephalitic infection in otitis. Infection through vascular channels he thinks is responsible for most cases of lateral sinus thrombosis, while vascular infection is a cause of extradural and brain abscess in a large number of cases. Many cases of extradural

¹ American Journal of Anatomy, November, 1912.

² Brain, 1912, vol. xxxv, part 2, p. 109.

abscess are caused by disease of the petrous bone, especially its posterior surface and tegmen. In those cases in which the bone is unaffected, the dura becomes infected through a septic endophlebitis of a vein of the tympanic mucosa extending to a vein of the dura. Cerebral and cerebellar abscess may be caused by direct contact of the brain with diseased dura; if perforation of the latter takes place, direct extension to the cerebral substance may occur; if no perforation occurs, the disease may spread to the brain by infection of the veins in the dura, with extension from them to the vessels of the pia, and from the latter to the interior of the brain.

Cerebellar abscess is often secondary to infective labyrinthitis, extension of the disease taking place along the nerve sheaths, or directly in the region of the posterior semicircular canal.

Leptomeningitis is either (a) secondary to a gross intracranial lesion or bone disease, in which case it is caused by the rupture of an abscess into the intradural space or by vascular infection from the lateral sinus, abscess, or bone, as the case may be; or (b) by labyrinthitis, with infection spreading along the nerve sheaths, or vascular infection from the middle ear direct.

Tylor's investigations show that infection of the labyrinth is responsible for many cases of cerebellar abscess and meningitis of otitic origin. Formerly, disease of the labyrinth, owing to lack of knowledge as to its pathology, did not receive sufficient attention as a cause of intracranial infection. Of recent years our knowledge of the diseases affecting it, and their bearing on the subject of encephalic infection, has increased rapidly.

Tylor remarks that at the present time, surgeons when operating for disease of the middle ear pay more attention to fistulæ or necrosis of its inner wall as evidence of possible labyrinthine involvement. Various clinical tests which have been introduced lately, such as the rotation tests and the caloric and galvanic reactions, when taken together, appear to afford a fairly sure means of diagnosing this condition. In this way many cases of labyrinthine infection are discovered which in earlier years would almost certainly have been overlooked.

A considerable number of cases of tuberculous and cerebrospinal meningitis occur in patients with infective ear disease in which the latter is not the obvious cause of the meningitis, and the question as to whether the ear can be regarded as being the channel of infection in such cases requires to be investigated further.

Encephalitis a Frequent Cause of Blindness. The investigations which Muskens and Snellen¹ have carried on regarding blindness have given important results. They began their investigations on the assumption that a history of arrest or retrogression of brain disease might be

¹ Review of Neurology and Psychiatry, May 1912, p. 210.

obtained in many cases of blindness, if a large number of blind persons were examined. The question is important, as it is widely recognized that palliative operation may cause retrogression of choked disk. Twenty out of 51 blind persons examined showed evidence of arrested brain disease in optic atrophy, and the authors think this percentage is too low rather than too high. The clinical information they obtained, the family histories, and the condition at the time of examination warranted the supposition that the different types of encephalomeningitis serosa (local, migrating, as well as the hydrocephalic varieties) in the majority of the cases may have caused the increased intracranial tension. Their examinations were made in a school for blind children, and all children who had given signs of defective mental qualities, fits, or paralysis had been refused admission to this school. The best period for decompression, these authors believe, is as soon as a choked disk of more than two dioptries swelling does not subside spontaneously in a few weeks. To one familiar with organic nervous disease, this large proportion of cases of blindness from arrested brain lesion is not surprising.

Progressive Lenticular Degeneration. A case which belongs to the type of disease described by Wilson is recorded by James E. H. Sawyer.¹ It differs in some respects from Wilson's cases as stated by Sawyer. The age of the patient at the commencement of the symptoms was later than in most of the recorded cases. In many, the symptoms began in childhood, whereas the symptoms began in Sawyer's patient about the age of nineteen years. The disease had been present seventeen years at the time of the report, and in all the other cases fatal termination occurred within seven years. In one case the duration was only four months. The tremors in Sawyer's case were always present, but varied in intensity from day to day, whereas in the recorded cases, when they had developed they never seemed to diminish. The muscular rigidity does not appear to have varied from day to day in any of the recorded cases; in Sawyer's case the rigidity never disappeared, but it varied in intensity from time to time, and even while the man was under observation. A limb which at one time was extremely rigid might at another time become comparatively flaccid. There were no true contractures in Sawyer's case, and contractures were conspicuous in all the other cases when the disease had been present even for a short time. In Sawyer's case there was no dysphagia, only a difficulty in mastication. There was no emaciation nor weakness. The man was not fat, but he was strong. Emaciation and contracture have been prominent symptoms in all the other reported cases, and sometimes have been early symptoms. There was no clinical evidence of involvement of the liver. Wilson has regarded cirrhosis of the liver

¹ Brain, 1913, vol. xxxv, part 3, p. 222.

as important in the symptom-complex. He examined Sawyer's patient and because of the age of the patient and the absence of emaciation and contracture, and because of the apparently inevitable way in which the malady has steadily progressed in all the recorded instances of progressive lenticular degeneration, he questions whether in Sawyer's case there was identically the same disease, *i. e.*, hepatitis with subsequent cirrhosis and a concomitant progressive degeneration of the lenticular nucleus.

The first case of progressive lenticular degeneration in the German literature has been reported recently by Stöcker.¹ In his case, the external ocular muscles also were implicated. There were dysarthria and dysphagia. A fine tremor was present in all the limbs, indeed in the whole body; it was not constant and was increased by intended movement. Lobular atrophy of the liver was found at the necropsy. The corpus striatum on each side appeared sunken in, the lenticular nuclei were of a peculiar yellow color, soft, and cystic. This case was different from those described by Wilson in that the tremor was slight, and that the external ocular muscles showed rigidity. A careful study of the brain is promised. Stöcker discusses the resemblance of progressive lenticular degeneration to multiple sclerosis, diffuse sclerosis, and the senile and juvenile forms of paralysis agitans.

Meningitis in Senility. It does not appear to be generally known that the clinical picture of meningitis may be very different in an aged person and in one still in the active period of life. Schlesinger² has written on the meningitis of senility, and his paper is very instructive. He shows that many cases probably pass unrecognized. He has examined 2000 autopsy records of the Vienna Pathological Institute relating to persons aged sixty years or over; many of these records were incomplete in their description of the nervous system. Forty-three cases of purulent meningitis were found in this number, *i. e.*, in more than 2 per cent. of the entire number. It seems probable that purulent meningitis may be the cause of death in senility more frequently than is supposed, and that senile persons are more liable to purulent meningitis. Of the 43 cases, 7 belonged to epidemic meningitis, but many of the cases, about one-third at least, resulted from purulent otitis media, and three times as frequently in men as in women. Streptococci and pneumococci were frequently found in the exudate, but as microorganisms may disappear from the exudate after a time, in some cases the exudate was sterile. One could not conclude from this that the meningitis was purely toxic in character.

According to the initial symptoms and the course of the disease, the following types of purulent meningitis, either of the epidemic or non-epidemic variety, in senility, are recognized by Schlesinger:

¹ Zeitschrift f. die gesamte Neurologie und Psychiatrie, 1913, vol. xv, No. 3, p. 251.

² Neurologisches Centralblatt, October 16, 1912, p. 1283.

1. Meningitis with classic symptoms.
2. Latent, sometimes walking forms, with vague symptoms or sometimes appearing as neuralgia.
3. Cases with apoplectiform commencement, with or without later hemiplegia.
4. Meningitis causing a rapidly beginning and rapidly developing dementia.

Kernig's sign is scarcely ever absent in the meningitis of senility, pronounced rigidity of the lumbar and thoracic vertebræ often is an early sign, whereas rigidity of the neck is much less frequently early and may not develop; mental disturbance is common.

The meningeal process often is latent a long time, and indistinct symptoms may cause an incorrect diagnosis; or the symptoms may begin acutely and the necropsy may show that the process must have been of much longer duration than the symptoms indicated. In one of Schlesinger's cases intercostal neuralgia existed two months, then sciatica developed, and a few days before death meningeal symptoms were detected. In two of his cases the somatic symptoms were much less conspicuous than the mental, and in both cases there was rapidly developing dementia. Schlesinger thinks it probable that many cases of senile dementia are caused by purulent meningitis.

Spinal puncture is of diagnostic value frequently, but not always. If the membranes have become adherent, no fluid may be obtained; if the process has been of long duration, the fluid may be clear, or may contain albumin, but few cells.

A post-pneumonic serous meningitis is not uncommon in senility, occurring during or immediately following the pneumonia.

Schlesinger does not speak of the danger of confusing arteriosclerosis of the brain with purulent meningitis, and yet this possibility is one we cannot ignore. The symptoms may be very similar in both processes.

Negative Lumbar Puncture in Meningitis. Positive findings in lumbar puncture are of great service, but negative findings may be very misleading, in that they indicate an absence of meningitis, in the opinion of some physicians. A statement made by Jules M. Brady¹ in reporting a case has great importance. He says: "It is believed almost generally that negative findings also, if extending over the late stages of the disease, will uniformly enable the absolute exclusion of meningitis. It must now be admitted that positive findings alone in this regard are conclusive, and that an encephalitis and meningitis may be present with a normal fluid. This does not apply to the tuberculous variety, as we now know that, in the later stages, tubercle bacilli are invariably to be found in the cerebrospinal fluid, though at times with difficulty."

The child studied by Brady had signs of meningitis and yet by

¹ Journal of the American Medical Association, March 29, 1913.

lumbar puncture 4 c.c. of a clear serous fluid were obtained drop by drop under less than normal pressure. No microorganisms and no increase of cell content were found. A thick fibrinopurulent exudate was on the brain at the necropsy, and an organism corresponding in all respects to the pneumococcus was obtained from the exudate. A similar case has been reported by Holt. The failure to obtain abnormal fluid may be caused by shutting off of the foramen magnum or by the density of the exudate.

Motor Region of the Brain. The investigations of the last few years seemed to show that only the anterior central convolution can be considered motor. Lewandowsky and Simons removed the entire anterior central convolution in ten apes. Electrical irritation three to six weeks after the extirpation gave no response from the posterior central convolution. From these experiments they conclude that the posterior central convolution has no projection fibers and is not irritable. The cellular structure of the two central convolutions is different, but Rothmann¹ argues that it would be a mistake to limit the zone irritable to the electric current to the anterior central convolution, because of the type of cells it contains. In man, movements are obtained by electricity only from the anterior convolution, but this may be because only weak currents may be employed in man or convulsions would result. Krause places the motor area entirely in the anterior central convolution from his operative experience on the human brain. Rothmann believes a difference in the electrical irritability of the two central convolutions may exist, and that it has not been demonstrated that the posterior convolution is not irritable. It is certain, he thinks, that the irritable region of the cerebral cortex is not confined to the fibers of the pyramidal tract. He has demonstrated that three to four weeks after the pyramidal tract has been destroyed alone or in association with the rubrospinal tract, irritation of the centres for the hand and fingers in the anterior central convolution is possible. He believes it is positive that in man and the ape the anterior central convolution has an extrapyramidal motor and electrical path.

He froze the anterior central convolution of the ape with the ethyl chloride spray and found that in this condition it had lost its irritability, but the posterior central convolution was irritable from a weaker current than could be used to produce results in a brain which had not been thus treated. The irritability of the anterior central convolution rapidly returned after the spray had been removed. The experiment shows that the posterior central convolution will respond to electricity when the anterior central does not, but it does not prove that the deeper part of the anterior convolution was frozen. He then removed entirely the anterior convolution in the ape, leaving the

¹ *Monatsschrift f. Psychiatrie und Neurologie*, December, 1912, vol. xxxii, p. 489.

posterior intact, and found that a weak but distinct electrical irritability of the posterior central convolution could be demonstrated two and one-half to three months after this operation, at a time when considerable voluntary movement had returned. The time that had elapsed after the operations was greater than in the experiments of Lewandowsky and Simons. Rothmann believes that the return of voluntary motion is indicative of the degree of restoration of the electrical irritability, and he encouraged the use of the paralyzed arm by tying the sound arm. He concludes that both central convolutions are sensorimotor in function, at least in apes, but the anterior is predominantly motor; the posterior predominantly sensory. After complete destruction of the anterior central convolution, the posterior convolution assumes considerable motor function, and after voluntary use of the affected limb and elapse of sufficient time, the electrical irritability at first lost returns, although in much diminished intensity. These experiments by Rothmann are of great importance in throwing light upon the motor cortex.

Cerebral Hemorrhage. When hemorrhage occurs within the skull, and is not the result of trauma, it is usually within a cerebral hemisphere in or near the basal ganglia. Localized meningeal hemorrhage, not traumatic in origin, is rare, as Babinski and Jumentié¹ state in reporting a few cases. In one case, it was confined to the left cerebral hemisphere in the motor area. In another, the symptoms were with exacerbation which is considered unusual from meningeal hemorrhage. Syphilis was believed to be the cause in this case and is believed by these authors to be a common cause of meningeal hemorrhage.

Pseudobulbar Palsy. In my chapter in *PROGRESSIVE MEDICINE* of last year, I referred to a case of pseudobulbar palsy reported by Karl Schaffer² as one which apparently settled the question of the occurrence of this symptom-complex from a unilateral lesion. It has long been doubted whether a single lesion of the cerebrum could produce such bilateral symptoms in muscles usually little affected in hemiplegia, but Schaffer's case appeared to be one in which a single lesion caused such symptoms, and the reputation of this investigator is so high that his findings appeared to be conclusive. They were obtained from macroscopic sections. Within a year Schaffer himself contradicts his conclusions, because within this time the macroscopic sections were cut into microscopic sections and stained, and examination of the slides revealed, in addition to the focus of softening in the right motor cortex, an old, small area of softening in the knee of the left internal capsule. The importance of microscopic serial sections is well shown by this case, and we shall now be more skeptical than ever of pseudobulbar palsy from a single cerebral lesion. The forma-

¹ *Bulletins et Mémoires de la Société méd. des Hôpitaux de Paris*, May 31, 1912.

² *Zeitschrift f. die gesamte Neurologie und Psychiatrie*, 1912, vol. x, Nos. 1 and 2.

tion of this small capsular lesion was not attended by any symptoms, and possibly the softening occurred during sleep. Schaffer speaks of such a lesion as "preparatory," inasmuch as by itself it had little or no clinical importance, but when the corresponding fibers in the opposite cerebral hemisphere were destroyed the bilateral symptoms appeared.

Schaffer distinguishes two kinds of forced laughter in pseudobulbar palsy: one a truly spasmodic action, another merely the result of diminished psychical inhibition. Various kinds of attacks may occur in pseudobulbar palsy; in addition to the typical apoplectiform attacks, there may be attacks of vomiting with increased or diminished temperature and headache, or attacks of sleep or stupor, or attacks of laughter.

In the second case reported in Schaffer's paper, the eyes deviated to the right, and could not be moved to the left, the head also was turned to the right. The lesion causing this conjugate deviation was a focus of softening in the right lower parietal lobe. Schaffer does not regard this displacement as the ordinary conjugate deviation so common in hemiplegia. It developed suddenly without loss of consciousness, and was a paralysis of associated ocular movements to the left (*Blicklähmung*). The eyes could be moved upward and downward, although these movements were somewhat impaired, and they could be moved to the right and from the right to the median line. This palsy lasted almost seven months. The persistence of this associated ocular palsy so long a time from one lesion is important in reference to Oppenheim's opinion, that each cortical centre for ocular movements innervates bilaterally, although especially those ocular muscles moving the eyes to the opposite side; and that a bilateral lesion is necessary for persisting paralysis of associated ocular movement.

Acute Bulbar Palsy following Mumps. A case reported by Collins and Armour¹ is believed by them to have been poliomyelitis produced by mumps. It seems possible that the mumps may not have been the direct cause, but by producing inflammation of the parts about the mouth may have rendered the child more susceptible to the poison of poliomyelitis when he was exposed. We need not conclude, as these writers do, that poliomyelitis may occur sporadically, and be caused by different organisms. Recent investigations point to a definite organism for poliomyelitis. The case reported is as follows:

A boy, aged eleven years, showed signs of mumps on a Sunday. A week later he was dizzy, he then complained of vertigo and headache, and felt ill and chilly. He became uncertain in his gait and station, and had a tendency to fall to the left. He was slightly stuporous, and had left facial paralysis, with nystagmus on looking to the left.

¹ Review of Neurology and Psychiatry, August, 1912, p. 361.

Dysphagia, dysarthria, and tachycardia developed. The boy died and the brain was removed. Round-cell infiltration was found in the basal parts, like that occurring in poliomyelitis.

DISEASES OF THE SPINAL CORD

THE LABORATORY METHODS OF DIAGNOSIS OF SYPHILIS AND THE TREATMENT. Collins and Armour¹ believe certain cases of tabes are more benefited by salvarsan than by any other remedy, but only those cases in which the clinical manifestations of the disease are dependent on a pathological process in the spinal cord, which is attended by great lymphocytosis. The constant result of the administration of salvarsan is great diminution of this lymphocytosis, which goes hand in hand with the patient's improvement.

These investigators compare their results with those of Nonne. The latter obtains a positive Wassermann reaction in 100 per cent. of cases in the blood of general paretics and taboparetics. The findings of Collins and Armour are the same. In the cerebrospinal fluid of these patients Nonne reports a positive Wassermann reaction in 85 to 90 per cent. by the original method, and even higher by the method in which larger quantities than 0.2 c.c. are used. Collins and Armour have used 1 c.c. of cerebrospinal fluid and have found the Wassermann reaction positive in 92 per cent. of these cases. Ninety-five per cent. of Nonne's cases show an excess of globulin and of cells in the fluid, while 86 per cent. of Collins and Armour's cases show an excess of globulin, and 71 per cent. an excess of cells.

Nonne's cases of tabes show an excess of globulin and cells in 55 per cent. of cases; Collins and Armour's show an excess of globulin in 33 per cent., and an excess of cells in 60 per cent. Nonne's cases give a positive Wassermann reaction in the blood in 60 to 70 per cent.; Collins and Armour's in 66 per cent. Nonne's give a positive reaction in the cerebrospinal fluid in 100 per cent. by the method of using larger quantities; Collins and Armour's only 41 per cent.

In cerebrospinal syphilis, Nonne's figures are positive Wassermann reaction in the blood of 80 to 90 per cent. of patients; Collins and Armour's, 88 per cent. Nonne obtains a positive reaction in the cerebrospinal fluid of almost all his cases; whereas only in 43 per cent. of the cases of Collins and Armour was a positive reaction obtained. Nonne's cases show a globulin excess in almost all cases; Collins and Armour's in 86 per cent. Nonne's show excess of cells in almost all cases; Collins and Armour's in 70 per cent.

The average dose of salvarsan, in the opinion of Collins and Armour,

¹ Journal of the American Medical Association, June 22, 1912, p. 1918.

should be 0.6 gram for an individual with syphilitic disease of the central nervous system whose vitality is not seriously impaired. In patients whose blood-pressure is high (above 165 by the Stanton apparatus), and in whom there is distinct evidence of cardiovascular degeneration, not more than one-half a dose should be given the first time. If the first administration be not followed within a fortnight by a chemical and microscopic evidence of cessation of activity of the syphilitic poison and the pathologic process conditioned by it (negative Wassermann reaction, diminution of globulin, great numerical reduction of lymphocytes in the cerebrospinal fluid), the dose should be repeated. The second dose should be the same as the first unless some special reason exists for increasing or diminishing it. If the first dose be followed by indications of cessation of activity of the pathological process, the second dose should be delayed for from six weeks to three months. These writers do not believe in repeated small doses. They have observed great physical improvement after the administration of salvarsan, attended by a feeling of well-being and an increase of weight. It is only fair to state that some neurologists do not approve of the large doses of salvarsan recommended by Collins and Armour, and prefer half the dose mentioned, repeated once or oftener.

The results obtained by Collins and Armour in the treatment of syphilis of the nervous system by salvarsan are much more favorable than those reported by other observers. In 36 cases of tabes in various stages of the disease, 22 showed striking, and, in some instances, remarkable improvement, both subjective and objective. In many instances the pain was mitigated or relieved, and in the majority of instances the ataxia was much improved. In 2 cases, iridic response to light was regained. They find the cases of meningomyelitis show the most gratifying results, but this is true also of the treatment with mercury. They feel convinced that the treatment of syphilitic disease of the nervous system is far more satisfactory with salvarsan than with mercury.

It is well to observe that the effect of salvarsan in the treatment of syphilis of the nervous system is represented differently by different writers. Ljass¹ has recently given the results of his observations. He has treated 28 cases with salvarsan. Of these, 5 were cases of brain syphilis, 8 were cases of progressive paralysis, 9 were cases of tabes dorsalis, 1 was a case of paralysis of the abducent nerve, and one was a case of periostitis of the occipital bone. The other cases belonged to the latent period of syphilitic infection. He concludes that salvarsan is a valuable means of treatment in some recent stages of syphilis of the nervous system, and may even save life. It has no positive effect upon tabes, but it is possible that in the early period of this disease it

¹ *Neurologisches Centralblatt*, February 15, 1913, p. 217.

may favorably alter the nutrition of the body and the subjective condition of the patient. It has no effect on progressive paralysis. As yet sufficient experience has not been obtained to determine whether salvarsan is able to ward off parasyphilitic disease.

Since Noguchi and Moore¹ have found the *Treponema pallidum* in the nervous tissue in progressive paralysis, it is possible that we may have to alter our views regarding parasyphilitic diseases as presented by Ljass and many other authors.

Camp² has made investigations to determine whether arsenic or salvarsan reaches the cerebrospinal fluid as ordinarily administered intravenously, and in what amount; and also whether the presence of cerebrospinal specific disease influences this to any degree. His experiments were conducted on 17 cases of syphilis, some with and some without involvement of the nervous system. In all cases, 0.6 grams of salvarsan in alkaline solution were injected intravenously in the arm, and the cerebrospinal fluid withdrawn by lumbar puncture in from fifteen minutes to forty hours after the injection. About 10 c.c. were used in testing for arsenic. In only one case was there the slightest trace of arsenic. He therefore concludes that doses of salvarsan up to 0.6 gram, or perhaps more, given intravenously, do not ordinarily result in the presence of any arsenic in the spinal fluid, and that arsenic is present in the spinal fluid practically only when the dose is so large or so frequently repeated as to cause a meningo-encephalitis which is sometimes of a fatal character. The assumption that the introduction of salvarsan into the blood stream causes it to reach all parts of the body is, therefore, not borne out by observation. If the therapeutic activity of salvarsan on cerebrospinal syphilis may be gauged by the presence of arsenic in the cerebrospinal fluid, we have an adequate explanation for its failure to benefit most cases, since it may be assumed that salvarsan destroys the spirochete of syphilis, but it can do so only by contact, so if the so-called syphilitic meningeal affections are caused by the presence of the spirochete they would not be reached by the spirillicide.

SOFTENING OF CORD AFTER SALVARSAN. We are beginning to have a proper respect for salvarsan, and to realize that at times it produces results very different from those expected. Newmark³ gives a very interesting report of a case he observed in which this drug seemed to cause serious results. The patient, a man, aged twenty-three years, received an injection of 0.3 gram salvarsan into each buttock on June 10, at noon. On the evening of June 12, having felt perfectly well in the intervening fifty-six hours, he first felt a numbness in his legs, then great fatigue in them, and soon after had difficulty in urinating. Throughout the day of June 13, his condition grew worse until the

¹ Journal of Experimental Medicine, 1913, vol. xvii, No. 2.

² Journal of Nervous and Mental Disease, December, 1912, p. 807.

³ American Journal of the Medical Sciences, December, 1912, p. 848.

power of motion in his lower extremities was almost abolished, and sensibility was impaired below the level of the navel. Softening of the spinal cord was found.

Newmark discusses this case in an interesting manner. The lesions were such as spinal syphilis is known to produce, and one might conclude that the syphilis and not the salvarsan had produced the condition. A patient of Collins and Taylor, who had had previously no sign of disease of the brain or cord, received one day, about six months after syphilitic infection, an injection of mercury; he felt the next day a numbness in the right leg, which he attributed to the injection, and after a few days he was paraplegic. The mercury could hardly have caused the paralysis in this case. Newmark thinks the comparatively brief experience we have had with salvarsan has not permitted such a sense of security from its use as we have from the use of mercury. A growing list of affections of the cranial nerves, the brain, or the spinal cord, subsequent to the administration of salvarsan will not let the suspicion die that we have to deal with a consequence of the remedy. He refers to two cases similar to the one he reports, and remarks that when subsequences repeat themselves with some degree of uniformity they come to be looked upon as consequences.

Ocular Palsy in Tabes. Advancement of the tendons of ocular muscles for the relief of tabetic diplopia is an operation seldom resorted to, because the ocular palsy at times is temporary and diplopia then disappears; or else, when the palsy is persistent, there is danger that it may be progressive. Rochon-Duvignaud and Dufour¹ report a pronounced case of tabes in which both external rectus muscles were advanced with overcoming of the diplopia. These muscles were only partially paralyzed before the operation. Lapersonne, in discussing this case, remarked that diplopia seldom disappears in tabes after muscular advancement. Many oculists decline to perform the operation in tabes, nevertheless some favorable cases have been reported.

TABETIC GASTRIC ULCER. Bilateral division of the vagus nerve was proposed by Alfred Exner for the relief of gastric crises in tabes, and he had the opportunity of seeing this operation frequently. Surprisingly often, as he expresses it, the scar of a gastric ulcer or an active ulcer was found at the laparotomy. This finding is of importance in connection with the fact established by division of the vagus nerve in rabbits, viz., that gastric ulcer almost invariably follows such division. The vagus nerves removed from persons suffering with gastric crises have been found diseased in some instances. Examination of the records of the Wiener pathologisch-anatomischen Institute for nine years by Exner and Schwarzmann,² has yielded 75 cases of tabes; in these, gastric

¹ *Revue Neurologique*, July 30, 1912, p. 130.

² *Wiener klin. Wochenschrift*, September 19, 1912, p. 1405.

ulcer occurred five times and gastric carcinoma three times. Four of the five patients with ulcer, and all three with carcinoma, had had typical gastric crises. These authors describe six of their own cases with gastric crises, and gastric ulcer or scar revealed by laparotomy.

The number of cases is small but is sufficient to justify the assertions of Exner and Schwarzmamm that chance occurrence will not explain the findings. Schüller believes that tabetic gastric ulcer is analogous with the tabetic ulcer of the foot, and is a trophic disturbance.

Syphilis as a Cause of Degeneration of the Motor System. It was many years before syphilis was generally recognized as the chief cause, and possibly the only cause, of tabes dorsalis, and it is largely owing to Erb that this recognition has been obtained. There is no objection on *a priori* grounds in accepting syphilis as a possible cause of the various diseases of the motor system, as primary lateral sclerosis, amyotrophic lateral sclerosis, and progressive spinal muscular atrophy. That in parasymphilis we may have a degeneration of the afferent fibers of the cord, viz., of the posterior roots and of their continuation within the cord, is a fact accepted by most neurologists. Can we have a similar degeneration of the central motor tracts and of the cells in the anterior horns of the spinal cord, or a combination of this type with degeneration of the posterior root fibers, as another form of parasymphilis? The idea is comparatively new and yet there is no reason why this condition should not occur. If we accept this possibility then the diseases under consideration cannot be regarded as always abiotrophic, even though they may be in certain instances.

I have repeatedly found a degeneration of the pyramidal tracts of the spinal cord, apparently primary, with marked lymphocytic infiltration of the pia. It seems improbable that the lymphocytic infiltration caused this degeneration, but it is likely that both have a common cause, the syphilitic poison. If motor fibers are susceptible to the syphilitic poison, it is natural to infer that motor cells likewise are susceptible, and it is not unreasonable to suppose that cases may exist in which the syphilitic poison exerts its influence chiefly on the motor system and produces little lymphocytic infiltration.

I have gone over my records and re-examined 9 previously reported cases of motor tract degeneration, and 1 case reported by S. Leopold,² to determine in what proportion the most common finding of spinal syphilis, viz., a lymphocytic infiltration, in slight or moderate degree could be found in the pia; and some degree of this has been found in every case, although in some it was so slight as to be questionable. Lymphocytosis of the spinal fluid is valuable as a sign of syphilis, though it is not pathognomonic. If the various types of primary degeneration of the central motor system are ever produced by syphilis,

¹ Journal of Nervous and Mental Disease, September, 1912, p. 584.

² Ibid., p. 606.

we should find at least some evidence of lymphocytic infiltration of the pia, even in absence of thickening of the vessels. If this infiltration were not present in a certain proportion of the cases one might well doubt the syphilitic etiology. Its presence does not prove syphilis. The importance of lymphocytosis of the cerebrospinal fluid as a sign of syphilis is widely accepted. It is found in other conditions than syphilis, but so is the Wassermann reaction. It occurs in a considerable number of individuals who have been infected with syphilis but have showed no symptoms. Nonne believes, without asserting it as a fact, that only those syphilitic persons develop nervous syphilis who have a lymphocytosis persisting after antisymphilitic treatment.

In support of the views expressed, I have reported a number of cases of muscular atrophy probably syphilitic in character, as tabes with Aran-Duchenne muscular atrophy, cerebrospinal syphilis with the same type of atrophy, and progressive spinal muscular atrophy probably syphilitic in origin.

Spinal Tumor. It is sometimes exceedingly difficult to determine the localization of a tumor on the spinal cord, especially when it is in the thoracic region and causes no objective disturbance of sensation. The case of Söderbergh¹ was one in which the thoracic localization was possible from the symptoms. Oppenheim has described a symptom-complex relating to the abdomen, in which there is atrophic paresis of one side of the abdomen, with disturbance of sensation and loss of the abdominal reflexes on the same side. The highest roots concerned in this complex are the eighth thoracic. According to Oppenheim, only the four lower thoracic roots are of importance for the innervation of the abdominal muscles, as only the uppermost part of the rectus and obliquus abdominis are supplied from the fifth to the seventh thoracic roots. The abdominal reflex lies in the eighth to the twelfth thoracic roots inclusive.

In Söderbergh's case, the almost permanent hypertonia of the abdominal muscles was striking, the entire abdomen was hard as a board. All reflexes and voluntary movement of the abdomen were lost. In coughing, a paresis of the uppermost left side of the abdomen was shown by a slight deviation of the epigastric median line to the right, while the position of the umbilicus was unchanged. There was diminution of the electrical irritability in the uppermost part of the left obliquus abdominis. Pain in the left hypochondrium had been an early symptom, but objective disturbance of sensation was not present. The seventh thoracic roots at operation were found much stretched by a tumor, and the spinal cord was pressed upon. The symptoms were explained by the lesion. The hypertonia of the abdomen was caused by implication of the cord at the level of the

¹ Deutsch. Zeitschrift f. Nervenheilkunde, vol. xlv, p. 202.

seventh roots. The complex is indicative of a lesion at the part of the cord supplying only the upper abdomen.

The case reported by Panski¹ is instructive because the symptoms were suggestive of myelitis, nevertheless operation was performed and the tumor was found. A woman, aged twenty-four years, previously healthy, without pains, suddenly developed fever and paralysis of the right limbs, followed the next day by paralysis of the left limbs. Transitory paresthesia with disturbance of bladder and rectum occurred. Examination during three weeks showed complete paralysis of the lower limbs, paralysis of the trunk, and much weakness of the upper limbs. Pain, touch, and temperature sensations were lost as high as the second rib in front.

One might be excusable in failing to diagnosticate this case as one of spinal tumor, and yet sudden onset of symptoms with fever, without pain in the limbs at the height of the tumor, has been known to occur with tumor pressing on the spinal cord.

A distinct advance in the diagnosis of spinal lesions has been afforded in Babinski's *reflexes of defence*, by which is meant a forcible withdrawal of the lower limbs from irritation of these limbs. By these reflexes some idea of the destruction within the cord, and from the extent upward in which cutaneous irritation produces them, some idea of the lower level of the lesion may be obtained. Babinski remarked that great contracture of the lower limbs in flexion occurs only when anesthesia of the limbs has not developed, or is slight, and the pyramidal tracts are not degenerated or are only slightly degenerated.

Auer² has done wisely in calling the attention of American physicians to this important symptom-complex, and in reporting two cases, although neither was with necropsy. As he gives Babinski's views, the chief characteristic of this form of spastic paraplegia is contracture of the limbs in flexion, the tendon reflexes being usually not exaggerated and often diminished, while the cutaneous reflexes are so markedly increased that irritation of the skin on the paralyzed side causes defensive movements of rapid withdrawal in flexion of the limb. It differs from the usual type of spastic paraplegia from degeneration of the pyramidal tracts in the contracture of the lower limbs in extension and exaggeration of the tendon reflexes. Babinski's form is often caused by a gradually progressing compression myelitis. The complex may be found in Friedreich's ataxia and in multiple sclerosis, in which the axis cylinders in the pyramidal tracts largely escape, although the myelin sheaths may be degenerated. It may occur in Pott's disease from compression of the cord. It is highly important, as Auer remarks, to be able to distinguish clinically between a paraplegia due to degenerative changes in the pyramidal tracts and one caused by

¹ Neurologisches Centralblatt, October 1, 1912, p. 1208.

² Journal of the American Medical Association, January 25, 1913, p. 269.

pressure not producing marked secondary degenerative changes. In the former case treatment is of little value; in the latter the prompt removal of the compression by surgical or other measures may be followed by great improvement. There is much need of attention by neurologists to this important complex and to a more accurate determination of its value.

More recent investigations make the reflexes of defence of doubtful value in deciding clinically between paralysis with and paralysis without degeneration of the pyramidal tracts. Dejerine and Long¹ reported at a recent meeting of the Neurological Society of Paris a case in which complete destruction of the cord in the cervical region had existed for almost eleven months and a necropsy had been obtained. The condition was one of flaccid paraplegia with loss of all superficial and deep sensation of the lower limbs and trunk. The patellar and Achilles reflexes were lost, but the abdominal and cremasteric reflexes were normal. This observation would seem to prove that the cutaneous reflexes are of spinal origin, contrary to the opinion of Bruns, Crocq, and van Gehuchten. The reflexes of defence produced by irritation of the skin or deeper parts were remarkably intense in both lower limbs, and yet the pyramidal tracts were degenerated. The plantar reflex was in flexion, and not extension as might be expected in such a case. This observation seems to prove that the extension of the toes is not conditioned solely by degeneration of the pyramidal tracts, but that the superior centres in some persons may have an influence on this extension reflex.

Rose reported a similar case with the reflexes of defence, in the discussion following the report of this case, and Babinski also referred to a similar case in which these reflexes were preserved, but did not appear to be of greater intensity than in normal persons.

The chief value of the reflexes of defence seems now to be in the determination of the lower level of a lesion in the spinal cord.

Contracture of muscles in the lower limbs usually is in the form of extension, and the tendon reflexes are exaggerated. This form Babinski² designates as tendinoreflex contracture. Another in which the contracture is in flexion, and the tendon reflexes are lost and have been lost from the onset of the disease, and the contracture depends on the cutaneous reflexes of defence, he calls cutaneoreflex contracture. The latter name he acknowledges is not satisfactory, as the deeper parts as well as the skin are concerned in the positions, but he can suggest no better term. He reports a case in illustration in which evidently some lesion of the pyramidal tracts was present. The contractures frequently relaxed, and at these times it was easy to

¹ *Revue Neurologique*, December 30, 1912, p. 769.

² *Ibid.*, July 30, 1912, p. 77.

determine that the tendon reflexes were lost. If, at a period of relaxation, the skin were pinched or the deeper parts were pressed upon, the contracture in flexion at once occurred. The same type of contracture was seen in one upper limb, and was much like that occurring in hemiplegia, except that the tendon reflexes were lost.

HODGKIN'S DISEASE CAUSING SYMPTOMS OF SPINAL TUMOR. Hodgkin's disease causing symptoms of compression of the spinal cord is of rare occurrence, and a case of this kind was reported by Mills and Martin.¹ Weakness of the lower limbs developed within a few days, although it had been preceded by pain. A growth was found at operation involving the spinal membranes, and encircling and infiltrating the cord. As much of this growth as possible was removed. Some improvement followed this operation.

The *surgery of tumor of the spinal cord* has become very important because the results often have been excellent. Intradural tumors afford usually a better prognosis than do extradural tumors, because the former often are well-defined growths, fibroma or endothelioma, in large measure depending on the interpretation of the pathologist; the latter often are infiltrating extensive growths of very malignant type. An intradural tumor may last many years and be of slow development. According to Merzbacher and Castex,² the investigations of Horsley and Schlesinger show that extradural tumors have an average duration of fourteen months, the intramedullary have an average duration of twenty-six months, whereas Bruns has found that the intradural fibroma and psammoma may last four, eight, or fourteen years. The longest duration of an intradural spinal fibroma seems to be in the case reported by Merzbacher and Castex, in this the tumor probably was growing during a period of eighteen years, and was of large size.

This tumor did not cause much pain, although pain was experienced in moderate intensity at the onset of the symptoms. Other cases in the literature have shown that pain is not always a sign of spinal tumor. The absence of this symptom may be from escape of the posterior roots from pressure or irritation by the tumor, or the pressure may be exerted so gradually on these roots that little irritation is produced.

OPERATION FOR RELIEF OF PAIN IN TUMOR OF THE CORD AND SIMILAR LESIONS. The operation of *cutting the anterolateral columns of the cord for the relief of intense pain* from an incurable lesion, referred to in my digest in *PROGRESSIVE MEDICINE* for last year, has been approved by the results in a case in which this treatment was employed, reported by Edwin Beer.³ This author remarks that the importance of obtaining

¹ Pennsylvania Medical Journal, March, 1913, p. 429.

² Deutsch. Zeitschrift f. Nervenheilkunde, vol. xlvi, No. 2, p. 146.

³ Journal of the American Medical Association, January 25, 1913, p. 267.

relief for these cases is self-evident. Compared with cutting of a large number of posterior roots to effect a similar result, division of the anterolateral column seems a much simpler and safer procedure. In the patient under the care of Beer, persistent right-sided pains stopped at once after section of the anterolateral column at the level of the tenth thoracic laminæ. The relief obtained was most striking, and as the patient was walking about eleven days after the operation, a more satisfactory outcome could not have been desired in the opinion of Beer. In June, 1910, the patient had a hysterectomy for carcinoma of the cervix. In September, 1911, she had severe and shooting pains in the right lower limb; the pain became worse and was referred to the right lumbosacral region as well as the right lower limb. The gait was limping and was believed by the patient to be of this character because of the pain. A tender, flat mass was detected in the right pelvis high up through the rectum. On May 29, 1912, a test injection of stovain was made into the spinal canal with complete temporary relief of all pain. The importance of this test Beer thinks cannot be overestimated. If stovain or novocain, etc., produce relief, the operation promises relief. If it fail, the operation is contraindicated. On July 2, 1912, laminectomy of the ninth and tenth thoracic vertebræ and section of the left anterolateral column were performed. The next day the patient felt remarkably well, and said she had none of her old pain. There was almost complete motor paralysis of the left lower limb and the left patellar reflex was absent. An examination made July 5 showed complete loss of pain sensation over the whole right lower limb from the mesial aspect of the groin anteriorly and posteriorly all the way down from the middle of the buttock. In the same area there was absolute loss of cold perception, cold being interpreted as heat. In this area heat was perceived slightly. Sensation of touch was very slightly affected. Sense of position was very accurate in all the joints. Perception of pressure, as in squeezing the muscles of the right lower limb, was slightly impaired. The patellar reflex on the left side became much stronger than that on the right side, and motion improved greatly within a few days, and the patient became able to walk, and had very little weakness of the left lower limb. Later, pain in the back developed, although all pain in the extremity had ceased. Whether a higher section would have abolished the pains that developed at a higher level along the spine, Beer thinks further experience must demonstrate. It seems to me that if the operation had been done originally at a higher level such pain would not have occurred or at least would have been unilateral. Beer's conclusions are:

Surgically considered, the operation of cutting the anterolateral column without doing serious damage to the rest of the spinal cord is perfectly feasible and not difficult.

Therapeutically considered, the almost complete freedom from pain produced by this surgical intervention met the indications presented in the case reported, and in many other sufferers a similar intervention will give similar relief.

Physiologically considered, section (complete?) of the anterolateral column produces (a) loss of pain sense on the opposite side of the body; (b) a disturbance in thermal sense which suggests that the fibers for heat and cold are disassociated in the cord; (c) slight disturbance of deep pressure sense and slightest disturbance in touch sense, both being impaired without producing any disturbance of the sense of position.

Carcinoma of the Vertebrae.—It is well known that carcinoma of the breast, stomach, or other part of the body is liable to give metastasis to the spinal column. If one depend too much upon this knowledge, he may diagnosticate spinal carcinoma where it does not exist, and overlook the lesion producing the symptoms. This is what happened in a recent case reported by Rauzier and Roger.¹ The symptoms seemed to be radicular in origin. An old woman had severe pain in the right thigh with weakness of this thigh and lumbar pain. The right patellar reflex was lost, the left was normal, and the Achilles reflex was normal on each side. The right thigh was atrophied and a band of hypesthesia was detected on the anterior part of the right thigh and extended to the superior part of the internal aspect of the leg. The lesion was supposed to be a neuritis, or more probably a radiculitis, an intravertebral compression of the fourth lumbar root by a carcinomatous pachymeningitis secondary to a uterine carcinoma. No such lesion was found at the necropsy, but a tumor of the cecum was found to be the cause of the symptoms. The sensory zones of the anterior crural nerve and of the fourth lumbar root are very similar. The carcinoma of the cecum had not been suspected, and a thorough abdominal examination does not appear to have been made. One might say that the mistake was unimportant, as little could be done in the way of treatment in either instance, and yet it is desirable to have a diagnosis as accurate as possible. The case shows how a neuritis may simulate a tumor of a root, and suggests that such a neuritis might be caused independently of a tumor, in which case the mistaken diagnosis might be serious.

Acute Poliomyelitis. It is remarkable that in this peculiar disease epidemics should have become frequent and widespread, especially since 1905, when previously the disease occurred usually sporadically. Why this should be is not easy to say, for the disease seems to be the same in whatever form it appears. As Müller² states, before 1905 an epidemic of 12 cases was considered noteworthy, and only once did

¹ *Revue Neurologique*, April 15, 1913.

² *Deutsche Zeitschrift f. Nervenheilkunde*, vol. xlv, No. 3, p. 212.

an epidemic number more than 100 cases. Wickman reported over 1000 cases, Leegaard had about as great a number, and in a recent epidemic in Sweden the cases reached the alarming number of 4000. Müller believes the virus enters the body in the respiratory and intestinal tracts, and angina and enteritis are frequently early symptoms. Food plays little part in the transmission of the disease, dust seems to be more important. The disease is most prevalent when insects are most abundant, but some epidemics occur in winter. There seems to be little doubt that the disease may be carried by a healthy person. Müller ends his paper with the pitiful statement that there are more questions and hypotheses than facts to be found in a discussion of poliomyelitis, and, in view of the great amount of important work that has been done on this subject, it is greatly to be regretted that we know so little of what is most essential.

Experimental work by Flexner, Clark, and Fraser¹ has made the existence of healthy carriers of poliomyelitis very probable. A child developed poliomyelitis. The parents were subjected to a nasopharyngeal irrigation with normal saline solution, and about 150 c.c. of fluid were collected, shaken, and pressed through a Berkefeld filter. This fluid was injected into a monkey, about 1.5 c.c. into the sheath of each sciatic nerve, and 140 c.c. into the peritoneal cavity. The symptoms of poliomyelitis developed and sections from the spinal cord showed typical lesions of experimental poliomyelitis. An emulsion of the spinal cord of this monkey was injected into each sciatic nerve and peritoneal cavity of two other monkeys. Both developed poliomyelitis and the lesions of this disease were found in the spinal cord. It is not easy to produce poliomyelitis in the monkey from the nasopharyngeal washings of healthy human carriers, and these experiments are exceedingly valuable and prove the existence of the virus of the disease in the nasopharynx of healthy persons who have been in close contact with an acute case of poliomyelitis and furnish an experimental basis for the belief, based on clinical observation, of the occurrence of passive human carriers of the infection.

TRANSVERSE MYELITIS FROM THE VIRUS OF POLIOMYELITIS. It is ridiculous to speak of a transverse myelitis in poliomyelitis, just as it is to speak of a cerebral type of poliomyelitis, and we need a convenient name that will correctly and briefly designate these forms of disease produced by the virus of poliomyelitis. Sachs² says few would suspect that a dorsal transverse myelitis might be a form of poliomyelitis. In the case he reported, complete flaccid paralysis of the lower limbs yielded, and when the patient left the hospital there was slight weakness of the right lower extremity and some slight hypalgesia from Poupart's ligament downward, more marked on the right than on the left side.

¹ Journal of the American Medical Association, January 18, 1913, p. 201.

² Journal of Nervous and Mental Disease, November, 1912, p. 747.

A few months later she walked splendidly, and of her serious illness there were no signs present, except the lively patellar reflexes and an exhaustible ankle clonus. In order to obtain positive proof of the nature of this infectious transverse myelitis, blood was taken from the patient's arm seven weeks after the onset of the disease, and sent to the Rockefeller Institute. The neutralization test showed that the patient had had poliomyelitis. This test is as follows: The serum is mixed with a fatal dose of a known virus, incubated from one to two hours at 37° C., and then allowed to stand for twenty-four hours on ice. The injections are made intracerebrally into monkeys. It has been found that, in certain instances, the serum of normal individuals contains antibodies which inactivate the virus, so that the test cannot be considered as invariably specific.

Sachs refers to similar cases by Anderson and Goldberger, and Kennedy, and in a paper on poliomyelitis by me published in the *Pennsylvania Medical Journal*, December, 1911, I referred briefly to one of my cases with symptoms of transverse myelitis which I suspected to be one of poliomyelitis.

OBJECTIVE SENSORY DISTURBANCES IN POLIOMYELITIS. A remarkable case of poliomyelitis has been recorded by A. Strümpell.¹ A man, aged nineteen years, was attacked suddenly, the paralysis spread to all four limbs, but it disappeared gradually, leaving atrophic palsy in certain muscles of the right forearm and right hand. The permanent lesion must have been in the eighth cervical and first thoracic segments. To this extent the case offered nothing very extraordinary, but the disturbances of sensation were unlike the symptoms usually caused by poliomyelitis. These disturbances were of the dissociation type, *i. e.*, analgesia and thermo-anesthesia existed with preservation of tactile, pressure, and so-called muscular sense, such a condition as is seen in syringomyelia. The area affected began with the third rib, and on the right side extended downward to a line passing through the ensiform cartilage in front. The upper level of the area was 5 cm. higher on the right side at the vertebral column than in front. Below this narrow band the sensation on the right side was normal. On the left side the disturbance of sensation affected the whole side of the trunk, back and front, and the lower limb. These findings indicated that the posterior horn was implicated.

Objective sensory disturbances have been observed occasionally in poliomyelitis. Müller has found hypesthesia often in the onset of the disease. In one case pain and temperature sensations were almost abolished in the paralyzed upper limb. Strümpell refers to a few similar cases in the literature, but states that such grave disturbance as was present in his case is rare.

¹ Deutsch. Zeitschrift f. Nervenheilkunde, vol. xlv, No. 2, p. 124.

The lesion of the posterior horn in his case must have been lower than that of the anterior horn, as the disturbance of sensation began at the third rib. It did not extend into the white matter, as the right lower limb was normal. Strümpell makes the suggestion that probably fibers of pain and temperature cross soon after entering the cord and ascend in the posterior horn. This is possible but we have not sufficient evidence at present to justify this assumption.

NERVE FUSION IN POLIOMYELITIS. Whether nerve fusion, as recommended by Feiss,¹ will be more useful than nerve anastomosis in the treatment of poliomyelitis is open to doubt. Feiss has been very enthusiastic over nerve fusion, and by this term he means that if two normal nerves are tied together so that their sheaths are thoroughly crushed, they will grow together at that point, and fibers will pass through the scar and enter the neurilemmar sheaths of both nerves below the scar. Thus a true crossing of fibers is obtained and stimulation of one of the nerves above the scar will usually evoke responses in the muscles supplied by the other nerve as well as by itself. Nerve anastomosis by the suture method is objected to by Feiss because a neuroma always forms at the point of union, and is made of proliferated cells which prevent the united nerve ends from remaining in accurate apposition. The newly regenerating fibers must pass from the upper segment through the cells in the swelling and enter the peripheral segment.

Feiss has no positive clinical evidence to justify the superiority of his method. In one case of poliomyelitis in which the paralysis was of several years' standing, no improvement resulted from the operation. Nerve anastomosis has not proved satisfactory in overcoming the paralysis of poliomyelitis, and yet I have observed in one case in which a single muscle was left paralyzed (the tibialis anticus), and in which nerve anastomosis was employed, great improvement result from this operation. It had been several years since the anastomosis was done. Massage was employed, but does not alone explain the return of function. Too much has been asked of the nerves in many instances in which nerve anastomosis has been done.

Progressive Spinal Muscular Atrophy from Trauma. Numerous writers have described disease of the nervous system produced by trauma, but in many instances the relation between cause and effect was not clearly shown. Erb² has analyzed the reported cases of chronic spinal atrophy depending on disease of the cells of the anterior horns. He reports an interesting case in which moderate trauma seemed to be the cause of progressive atrophy. A man, aged thirty-one years, after trimming grapevines, experienced severe pain in the right thenar eminence, and first interosseous space, which lasted one to two weeks. There was

¹ Review of Neurology and Psychiatry, November, 1912, p. 509.

² Deutsch. Zeitschrift f. Nervenheilkunde, vol. xlv, No. 1, p. 1.

no swelling, no redness, no heat, no hemorrhage in the hand. Two or three months later he noticed that the right hand was becoming weaker and was atrophying. The weakness and wasting extended to the forearm, and in less intensity to the upper arm and shoulder, and was attended by partial reaction of degeneration and fibrillary tremor. The tendon reflexes of both upper limbs were unusually prompt. It was clearly a case of chronic progressive muscular atrophy, and Erb believed the overexertion in trimming the vines was the cause.

After critically examining a number of cases in the literature, he concludes that overexertion alone or simple moderate commotion of the vertebral column and spinal cord without overexertion, taking cold, or severe injury of the bones or soft parts, may cause chronic progressive disease of the motor apparatus in the cord and medulla oblongata.

Trauma a Cause of Spastic Spinal Paralysis. Sarbó,¹ following the suggestions offered by Erb's paper on lesions of the peripheral neurones produced by trauma without immediate and gross injury, publishes a case which he thinks demonstrates that trauma may be the cause of progressive degeneration of the central motor neurones. His patient was a coachman, who, after his horses ran away with a wagon in which he was seated, experienced weakness and tremor in the feet, although he does not appear to have been injured otherwise. He had braced his feet firmly while the horses were running. He continued his occupation of coachman, and five years later met with an accident of the same kind, after which his symptoms increased in intensity, so that he walked with difficulty. Two years later his horses again ran away and his condition became worse as a result of this accident, and was one of spastic spinal paralysis. No history of syphilis was obtained, and the Wassermann reaction was negative. Sarbó¹ examined the man eight years after the commencement of his symptoms. He believed he could exclude hysteria. The man was almost completely paralyzed in his lower limbs, so that walking was exceedingly difficult, these limbs were very spastic, the patellar reflexes were exaggerated, ankle clonus was present, and plantar irritation produced extension of the toes. Sarbó¹ believes the overexertion produced by bracing the feet firmly was the cause of exhaustion of the pyramidal tracts and of their degeneration.

The case loses somewhat in value in the absence of necropsy, but it is indeed striking that three accidents of the same character should occur, and that after each the symptoms should increase. This would make the existence of some gross lesion as hemorrhage or displacement of vertebræ improbable.

Pott's Disease. The symptoms occurring in Pott's disease are attributed by most neurologists to the external pachymeningitis, and

¹ Deutsch. Zeitschrift f. Nervenheilkunde, vol. xlvi, p. 43.

in my report published in the 1911 volume of *PROGRESSIVE MEDICINE* I referred to a paper by Cadwalader, in which a case of tuberculous external pachymeningitis without implication of the vertebræ was described; a case that had been under my care in the hospital. Syllaba¹ reports another case of this character, but does not refer to Cadwalader's paper.

Fracture of the Vertebræ. There may be a field for anastomosis of anterior spinal roots, but the reported cases are not as yet sufficiently numerous to afford convincing proof that regeneration with return of function really occurs. Kilvington has employed this method on dogs, and in one case at his suggestion it was attempted on man, but was not successful. Frazier and Mills² report a case in which a motor root above was anastomosed with a motor and sensory root below, and they considered the operation successful. It was performed for the relief of incontinence of the bladder. Eight months after the operation the man stated that he could dispense with the urinal, which he had hitherto worn constantly, for a period of twelve hours, and that with the assistance of pressure over the suprapubic region, partial evacuation of the bladder was possible. In a footnote these authors state that the man was able to retain the urine for two and a half hours at a time.

Localization of Sensation in the Spinal Cord. Theodore Thompson³ believes, from the study of the spinal cord in a case of anemia in which the degeneration was almost confined to the posterior columns, that certain conclusions may be drawn concerning the functions of these columns. Complete lesion of the long fibers of the posterior columns results in a loss of the sense of passive position, ataxia, and loss of discrimination of points and weights. Localization of touch is but little affected. Painful, thermal, and tactile impulses can ascend the cord, although the posterior columns are degenerated. The evidence derived from this case Thompson believes is at variance with the view of Pétren, that a lesion of the posterior column does not produce a loss of muscle sense unless the dorsal spinocerebellar tract in the same half of the spinal cord is likewise affected.

New Symptom-complex Resembling Pseudosclerosis. A symptom-complex is described by Bruno Fleischer⁴ as one representing a new disease. In 1902, Kayser described a case with a peculiar greenish-brown pigmentation of the periphery of the cornea; two similar cases were then reported by Fleischer, and a fourth case was seen by Salus. In all four cases, the corneal pigmentation was associated with severe nervous symptoms, regarded as those of multiple sclerosis. Fleischer

¹ *Neurologisches Centralblatt*, November 1, 1912, No. 21, p. 1346.

² *Journal of the American Medical Association*, December 21, 1912, p. 2202.

³ *Brain*, 1912, vol. xxxiv, part iv, p. 510.

⁴ *Deutsch. Zeitschrift f. Nervenheilkunde*, vol. xlv, No. 3, p. 179.

later disputed the diagnosis of multiple sclerosis. The chief features of this disorder are pigmentation of the eye, and, in one case, of the skin also, the nervous symptoms, diabetes, cirrhosis of the liver, and enlargement of the spleen. A tremor is observed in these cases, is of considerable intensity, implicates the whole body, and is increased by movement or excitement. It may become so severe that the patient is able to walk only with difficulty and cannot feed himself. The mental state is peculiar; there is increased irritability, tendency to acts of violence, a condition varying between depression and hypomania, and impairment of intellectual power. The nature of this remarkable affection is most obscure; it seems to have some resemblance to pseudosclerosis. No name is suggested for it.

Werdnig-Hoffmann Type of Muscular Atrophy. Cases of this type with necropsy are exceedingly rare, and the report of a case by Batten and Holmes¹ is important, especially as the distinction between the Werdnig-Hoffmann atrophy and the amyotonia congenita of Oppenheim, is by no means clear. The case reported by these authors was one in which positive symptoms seem to have begun when the child was about six months old. At that age she began to grow weak, and between the ages of nine and twelve months she lost almost all power in her limbs, and became unable to sit up, or to hold her head erect when it was unsupported. The proximal muscles were more paralyzed than the distal. The child died at the age of two years and nine months. The cells of the anterior horns of the spinal cord were few in number, and those that were preserved were much atrophied. The muscles also were much atrophied. The hypotonia was not so great as that seen in amyotonia, and yet one may well be justified in asking whether this case would not be regarded by many as one of amyotonia congenita, indeed the authors say that some of the observers regarded it as belonging to this disease.

A similar case with necropsy is reported in the same journal by Parsons and Stanley.² These authors say the number of well-authenticated cases of the Werdnig-Hoffmann atrophy is 21. The two cases referred to above would make it 23.

DISEASES OF THE NERVES

Syphilitic Polyneuritis. As Hoffmann³ says, we have learned much concerning syphilitic affections of the central nervous system, but we know comparatively little regarding syphilitic disease of the nerves. Syphilitic paralysis of a single nerve, as of the facial, ulnar, peroneal or crural has been recognized, but syphilitic polyneuritis has been a

¹ Brain, 1912, vol. xxxv, part 1, p. 38.

² Ibid., p. 50.

³ Neurologisches Centralblatt, September 1, 1912, p. 1075.

much disputed subject. The polyneuritis has been attributed by some to the mercury employed in treatment. The syphilitic polyneuritis occurs in the secondary stage of syphilis, at the time of the eruption, swelling of the glands, and angina, about three to eighteen months after the infection. It has not been observed in the period of tertiary syphilis at a time when mercury has been used extensively, and this speaks against the mercurial origin of the disease. The syphilitic polyneuritis may begin more frequently in the upper than in the lower limbs, it causes ataxia more frequently than other forms, and sometimes pseudotabes and rectal and bladder symptoms. Hoffmann discusses the syphilitic polyneuritis, and then reports a case which is especially interesting as it had reached a considerable development before the syphilis was detected. The neuritis began in the hands and arms, and within three or four months caused severe ataxia, tremor of the hands and arms, and athetoid movements in the ends of all four limbs, such as occur occasionally in tabes. The symptoms were numerous, but it is noteworthy that pain was never felt. Motor palsy developed late, and the nerves became enlarged. The Wassermann reaction of the blood was strongly positive, and the lymphocytes were very numerous in the cerebrospinal fluid. Improvement was pronounced when antisyphilitic treatment was employed.

Negro's Sign in Facial Palsy. There has been great activity in seeking new signs of disease of the nervous system and this has been especially noticeable in the writings of French authors. The sign of Negro was described in 1905. It is as follows: When a person with peripheral facial palsy looks upward as far as he is able, the eye on the paralyzed side goes higher than that on the sound side. The movement is regarded as one of substitution, *i. e.*, on account of the paralysis of the frontalis muscle the energy employed in the attempt to contract this muscle is diverted to other muscles, and consequently greater contraction occurs in the superior rectus, inferior oblique, and the levator palpebræ superioris, all innervated by the oculomotor nerve. This is Negro's explanation, and it sounds reasonable. Castro¹ points out that in addition to the real elevation of the eye on the paralyzed side, the paralysis of the orbicularis palpebrarum with the resulting enlargement of the palpebral fissure makes the elevation appear greater than it really is. He believes the sign is always to be found in peripheral facial palsy, and is important in distinguishing peripheral facial palsy from central facial palsy, as in the latter the upper branch of the facial nerve is not seriously affected. The sign in bilateral facial palsy shows which side is the more affected.

Tic Douloureux. The frightful pain in some cases of tic douloureux has been stopped only for a short time by injection of alcohol into

¹ Revue Neurologique, February 15, 1913, p. 149.

the peripheral branches of the trigeminus nerve, and yet it is a valuable means of treatment on account of its comparative freedom from danger and the relief it often affords. Injection of alcohol directly into the Gasserian ganglion is rather audacious, but a method has been elaborated by Härtel and the technique of his method is described in detail by Grinker,¹ who has employed it in one case. He speaks of the danger of neuroparalytic keratitis, a condition which Härtel observed in 4 of 10 cases. The eye on the operated side should receive special treatment, and the patient should be in the hospital several days before the injection is given. The treatment has been very successful in Härtel's hands. It is a method only to be used in the worst cases, after peripheral nerve injections have failed to relieve the pain, or after numerous recurrences. Grinker's case was one in which about ten injections of alcohol into the peripheral nerves at the base of the skull had been made, only one of which gave relief for about a month. After the injection into the ganglion the two lower branches of the trigeminus became completely anesthetic, and the patient left the hospital free from pain. Sufficient time has not elapsed since the treatment of Grinker's patient to permit one to judge of the durability of the relief. The method is one which offers great promise.

MISCELLANEOUS NERVOUS DISEASES

Epilepsy. Bolten² concludes that true or essential epilepsy is a toxic condition caused by metabolic changes or decomposition of food, but the nature of this toxin is unknown. The toxic products are not neutralized because of imperfect action of the thyroid and parathyroid glands, which are supposed to protect the central nervous system from poisonous substances. The impaired function of these glands may possibly result from disorder of the lowest ganglion of the cervical sympathetic nerves. The pathological findings in the cerebral cortex in epilepsy are not the cause of epilepsy but are secondary and are produced by chronic intoxication. True epilepsy in many cases cannot be distinguished clinically from symptomatic epilepsy caused by meningitis or meningoencephalitis. *Epilepsia tarda*, although presenting many of the symptoms of true epilepsy, is a very different affection. True or essential epilepsy may be cured, or at least the symptoms may be made to disappear by rectal injections of the fresh juice of the thyroid and the parathyroid glands of cattle.

Epilepsia Alternans. Comparatively little is known concerning this form of epilepsy, and an excellent illustration of it is given in a case

¹ Journal of the American Medical Association, May 3, 1913, p. 1354.

² Monatsschrift f. Psychiatrie und Neurologie, February, 1913, p. 119.

reported by Ernst de Vries.¹ A child, aged two and one-half years, was suddenly taken ill with symptoms suggesting encephalitis. From this time the child was weak in the left side of the face and the left upper and lower limbs, had horizontal nystagmus only of the right eye, and attacks of tonic contracture in the left side of the face and left limb, with—and this is the important feature of the case—forcible conjugate deviation of the head and eyes to the right, *i. e.*, to the side opposite to that in which face and limbs were affected. Consciousness was preserved during the attacks. Usually cerebral irritation in causing attacks such as are described by de Vries would result in the turning of the head and eyes toward the side of the affected limbs. Only 2 cases of alternating epilepsy have been found by de Vries in the literature.

In a case recorded by Bernhardt a tumor of the pons caused paralysis of the face on the right side and weakness of the left extremities. Convulsions occurred in the face in the side opposite to that in which the limbs were in convulsion. In a case recorded by Winkler, likewise a tumor of the pons, epileptic attacks occurred in which the head and eyes were drawn to left, the left side of the face was implicated in the spasm, and the right limbs were in tonic spasm. Occasionally during the attacks twitchings occurred in the limbs, but were not of the typical clonic character of cortical epilepsy. In a case reported by Mann and Délépine, a tumor in the region of the corpora quadrigemina produced spasms of a tonic, not clonic, character.

Bernhardt's case differs from all these mentioned in that the convulsions were clonic. It is known, as de Vries states, that pressure on cranial nerves may cause clonic movements in the musculature innervated by these nerves, but it is more doubtful whether rhythmic movements may be produced by irritation of the pons. The correctness of this first statement I can bear witness to, as some ten years ago I first observed clonic convulsions in the face from pressure on the facial nerve by a tumor at its exit from the pons.

Nothnagel asserted that irritation of a certain part of the floor of the fourth ventricle would cause general convulsions. This opinion has been received with great opposition, but Binswanger demonstrated that irritation of this region causes an epileptiform attack only when the motor cortex is intact. Summation of irritation, as de Vries puts it, and thereby the ability to cause epileptic attacks, is not to be accepted as possible from irritation in this part of the brain, and as a cause of at least clonic contractions. The usual form of contraction from subcortical irritation is tonic rigidity of muscles, and de Vries concludes that irritation of the pons may cause clonic reflex movements, that there is never a summation of this irritation causing repeated clonic movements, and that these movements disappear immediately

¹ *Neurologisches Centralblatt*, March 16, 1913, p. 341.

when the irritation ceases. The clonic portion of the epileptic attack depends on the irritation of the cerebral cortex.

The implication of the trunk muscles in paralysis or convulsion is always greater from a subcortical lesion than from a cortical. Unverricht has shown that if the trunk muscles are thrown into spasm by cortical irritation, the trunk inclines away from the side in which the limbs are in convulsion. This is a remarkable observation.

The lesion in de Vries' case causing the alternating epilepsy, according to the author, must have been in the forward part of the right side of the pons, and from here fibers passing to the right abducent nucleus must have been irritated; in this way the right deviation of head and eyes is explained.

Familial Amaurotic Ataxic Paraplegia. The group of three cases in one family described by Purves Stewart¹ does not correspond with any known type. It is characterized by:

1. Primary optic atrophy with marked impairment of vision. The visual defect in the two older children dated from infancy; in the younger child it did not supervene until the age of seven or eight years.

2. Divergent strabismus, evidently due to the loss of binocular vision. Such strabismus, without ocular paralysis, is common in cases of blindness from optic atrophy.

3. Deformity of the feet. Talipes equinovarus, varying in degree in different cases.

4. Absence of scoliosis, even in advanced stages of the disease.

5. Evidence of cerebellar degeneration. Unsteadiness of the upper limbs (except in the youngest of the series) and of the lower limbs in all three cases. The ataxia was uninfluenced by closing the eyes.

6. Signs of pyramidal tract degeneration. Extensor plantar reflexes in all three. Ankle clonus was present in case 2. In cases 1 and 3, the ankle-jerks were diminished or absent.

7. Alteration of the gait together with contracture of the calf muscles.

8. Nystagmus. This was well marked in one case, poorly marked in another case, and absent in the third.

Amaurotic ataxic paraplegia differs from Friedreich's ataxia in the occurrence of early and intense optic atrophy with marked divergent strabismus, and in the absence of scoliosis or of articulatory difficulties.

It differs from Marie's hereditary cerebellar ataxia in the early age of onset, in the absence of articulatory difficulty, in the intensity of the optic atrophy and blindness, and in the presence of marked deformity of the feet.

Reflex Pupillary Rigidity in Diabetes. Occasionally certain symptoms in diabetes may resemble those of tabes, and the differential diagnosis

¹ Review of Neurology and Psychiatry, August, 1912, p. 357.

may be difficult or even impossible; indeed, the case may be regarded as one of tabes with diabetes. The action of the irides has been considered of value in diagnosis in such cases, but Biermann¹ now reports a case of diabetes in which he believed this disease caused reflex pupillary rigidity. A woman had pain in the left side of the abdomen, and, after a period of improvement, severe pain was felt in the left thigh, later extending into the foot. The left lower limb became weak and felt cold. Walking became difficult. The light reaction was lost in the right eye and was very weak in the left eye. The Wassermann reaction was negative in the blood and cerebrospinal fluid, the Nonne-Apelt reaction was negative, albumin was not increased in the fluid, nor was lymphocytosis of the fluid found. The case was diagnosticated as one of diabetic neuritis of the anterior crural nerve with diabetic pupillary rigidity. Alcoholism was excluded, although the patient had taken a certain amount of alcohol fifteen years previously. The absence of miscarriage, of lancinating pain, or paresthesia, and the negative results of the tests of the blood and cerebrospinal fluid made Biermann positively exclude tabes on a syphilitic basis. The case is of value in indicating that diabetes may produce reflex pupillary rigidity; whether it will be generally accepted as a positive demonstration of such an occurrence remains to be seen.

Myasthenia. Sudden onset of asthenia and short duration of this condition are striking and difficult of explanation. Riesman² reports several cases of this character; as an example: A physician, after an attack of influenza and a severe wetting, was somewhat weak one morning on arising from bed. The weakness gradually increased during the day and by evening was pronounced, and on the following morning he got out of bed only with great effort. Three days after the onset of the attack he could not leave his bed without help. When in bed he could not put one foot over the other, and the weight of the bedclothes was sufficient to neutralize what little power he had. On one occasion a pillow fell on his face, and supreme effort on his part was necessary to toss it off. The man did not feel as though he were paralyzed, but as though he were completely exhausted. There were no other symptoms, even the knee-jerk was normal, and the mental processes were active. When the patient was seen by Riesman two months after the beginning of his disorder he was still weak in the knees, but the knee-jerk was exaggerated. The patient at the onset had bradycardia, subnormal temperature, and bradypnea. Myasthenia gravis, periodic palsy, Landry's paralysis, and hysteria could be excluded. The myasthenia seemed to Riesman to be caused by temporary functional insufficiency of the adrenals, as experimentation explained in this way the muscular prostration and hypothermia.

¹ *Neurologisches Centralblatt*, October 1, 1912, p. 1203.

² *Journal of the American Medical Association*, June 15, 1912, p. 1846.

In another case in which similar symptoms were present, Riesman prescribed suprarenal extract. Recovery was prompt, whether *propter hoc* or merely *post hoc* he does not attempt to decide. Of the 4 cases he reports, 3 had in common a sense of physical weakness amounting to actual prostration, a feeling of coldness, and subnormal temperature. In 2 cases, there were slow pulse and low blood pressure. Recovery was prompt, in 2 cases within three or four days.

Riesman believes these cases have their readiest explanation in some disturbance in the functions of the organs of internal secretion, through which the sympathetic nervous system and the voluntary muscles underwent a change. The chief controller of these two systems probably is the adrenal, or, better, the chromaffin system. The functions of this system are manifold and complicated, but two are interesting in this connection, the angiotonic and the antitoxic. Through the former, vascular tone and blood pressure are maintained; through the latter, the fatigue products of muscular activity are neutralized. As Riesman says, no definite clinical picture has as yet been established of mild temporary insufficiency of these functions. Much attention has been given to Addison's disease, which has been attributed to destructive changes in the adrenal, although a few have supposed there may be merely a functional disturbance of the gland or of the entire chromaffin system as a basis for this complex. In recent literature, cases are recorded in which various acutely fatal conditions were found at necropsy associated with destructive changes, hemorrhagic, necrotic, inflammatory, of the adrenals. The symptoms in such cases differ from those of the Addison complex in absence of pigmentation and in the shortness of their course. Riesman makes several groups of adrenal insufficiency.

1. The type characterized by shock, gastro-intestinal symptoms, bradycardia, lumbar pain, and death in a few days, a clinical picture somewhat resembling that of acute pancreatitis.

2. The asthenic type, in which the predominant feature is profound asthenia, ending in death within a few days.

3. Cases of sudden death, in which the necropsy shows as the only adequate morbid change a destructive lesion, usually hemorrhagic, of the suprarenal gland.

4. A nervous type, marked by convulsions, coma or delirium, with muscular twitchings.

This paper of Riesman seems to me of so much importance that I have given considerable space to it in this review.

Chorea. The finding of certain signs in chorea suggesting disease of the brain, cerebrum, or cerebellum, and especially of the motor tracts, is one of the most interesting results of the recent study of chorea. I have referred to this subject previously in *PROGRESSIVE MEDICINE*.

Grenet and Loubet¹ have made some investigations on the organic nature of the disorder. Many of the signs searched for are capable of leading one into error if he be not very careful. In their examination of 74 reported cases of chorea, these authors find that hypotonia was present in 51, and in 28 was more pronounced in the supinators of the forearms; adiadochokinesis was present in 43, and other signs of incoördination in a large number of cases; Babinski's sign in 19, etc. It is suggested, therefore, that chorea may be caused by acute encephalitis, of slight intensity with quick disappearance. While these investigations are very interesting, I do not feel that they have firmly established the existence of brain lesions in Sydenham's chorea.

Manganese Poisoning. It is well known that certain substances as arsenic and lead may cause degeneration of the peripheral nerves, but we are not so familiar with the selective action of such substances on the central nervous system, except lead. Casamajor² reports cases in which symptoms of central origin occurred in workers in material from a mine in which zinc was the principal product, but many other ores were obtained, so that the nature of the poison could not be determined. The course of the disease Casamajor describes as follows: After a man has worked in the ore dust for a length of time varying from six months to three years, he begins to notice that he has difficulty in walking, especially that he is unable to walk down hill slowly. On level ground and up hill he has no trouble, but when he starts to walk down an incline he goes faster and faster, until at length he must run to keep from falling forward, and must continue to do so until he runs against some object which stops him, or until he falls down. Retropulsion develops with this propulsion, and the man finds himself unsteady on his feet whenever he wants to move. The gait is like that of paralysis agitans, and other symptoms also resemble those of this disease. Pain and stiffness in the legs were noticed at the onset in 4 cases, insomnia in 1, and difficulty in writing in 1. About half the patients have defective hearing not caused by middle-ear disease. The speech is slightly slurring in some cases. The facies resembles that of paralysis agitans in its mask-like character. There is more or less tendency to impulsive laughter. Tremor of the tongue is common, as is also a fine static tremor of the hands. Asynergia is always present in well-developed cases. The eyes are normal. Muscular power is well preserved. The deep and superficial reflexes and sensation are normal. The Wassermann reaction was negative in the 5 cases in which it was employed. There is no definite mental side to the clinical picture. Recovery has not occurred, although improvement is common. In 1 case a necropsy was obtained, but the examination as yet is very incomplete. Casamajor believes that manganese

¹ *Revue Neurologique*, December 15, 1912, p. 632.

² *Journal of the American Medical Association*, March 1, 1913, p. 646.

is the probable cause, and that it is taken into the system through the gastro-intestinal tract.

Carbon Monoxide Poisoning. In the case reported by McConnell and Spiller,¹ a relapse occurred after apparently full recovery from poisoning by coal gas. The patient had been overcome while sleeping, and was found unconscious. She recovered consciousness after ten hours, and in two days was supposed to have recovered fully. This condition of good health lasted only a few days. She again became unconscious. All the limbs became spastic and the tendon reflexes exaggerated. The muscles of mastication also became spastic, and death ensued nineteen days after admission to the hospital and forty days after the asphyxiation.

A well-defined area of softening was found in the inner segment of each lenticular nucleus. These areas were almost equal in size and had almost the same upper and lower limits. The walls of the vessels within these areas were calcified and numerous round or irregularly shaped masses, most of them having the structure of corpuscula arenacea (brain sand) were found throughout the softened areas. The explanation of this peculiar softening from carbon monoxide is given by Kolisko. He showed that short arteries arise from the anterior cerebral, the carotid and the first part of the middle cerebral and posterior communicating arteries and do not anastomose. They convey the blood in a different direction from that in the parent stem, and supply the anterior part of both inner segments of the lenticular nucleus and the adjoining part of the internal capsule. Great distention of these vessels occurs in the early stage of carbon monoxide poisoning.

The case reported by McConnell and Spiller shows that the recurrence of symptoms may be caused by calcification of the small arteries leading to progressive degeneration in the areas nourished by these vessels.

Ankle Clonus. A case that Potts² reports shows that ankle clonus is not necessarily a sign of organic disease of the central nervous system. Some neurologists maintain that a pseudoclonus may occur in hysteria, but never a true clonus. The patient Potts presented was a man, aged twenty-eight years, a medical student. He had never had any illness, had been normal in every way from childhood, and was one of the leading men in the class. The phenomenon was discovered accidentally by one of his fellow students when they were practising various methods of examination upon each other. The man had noticed that from childhood resting the toes lightly upon the ground would at once cause marked clonic movements of the foot. The ankle clonus elicited in the usual way was very marked on the right side; on the left it was present, but not so marked. The Babinski reflex was absent, the toes being flexed. The patellar reflexes were normal. The phenomenon

¹ Journal of the American Medical Association, December 14, 1912, p. 2122.

² Journal of Nervous and Mental Disease, October, 1912, p. 658.

was present at a number of examinations, and no other evidence of disease of the nervous system or of any other organs was obtained. The man did not have muscular cramps or difficulty in walking.

INVERSE ANKLE CLONUS. Ankle clonus is a sign of great importance, but I have never been willing to accept it as proof of organic disease. I have seen it in purely functional disturbances such as are regarded as hysterical. Some writers speak of this phenomenon under such conditions as pseudoclonus, and describe the movements as irregular, changing in intensity from moment to moment and soon ceasing. I have seen ankle clonus in hysteria of a character that could not be distinguished from that occurring from disease of the central motor tracts. The movement usually is produced by forcibly flexing the foot on the leg so as to put the calf muscles on the stretch, and the movement produced in this way is one of alternate flexion and extension. In some instances lateral movements have occurred in ankle clonus. Ankle clonus by forcibly pushing the foot downward so as to relax the calf muscles, is something new, but has recently been observed by Joseph Thiers,¹ and was the result of putting the anterior tibial and the common extensor of the toes on the stretch. To this phenomenon Thiers gives the name of clonus inverse. It has no significance beyond that of the usual type of ankle clonus.

Sittig² has observed a form of foot clonus similar, if not the same, as that described by Thiers. When the foot was forcibly pressed downward rhythmic contractions of the dorsal flexors of the foot occurred (tibialis anticus and extensor longus digitorum). The significance of this reflex is unknown. It is not related to spastic conditions, and may not be found in hemiplegia or multiple sclerosis. V. Bechterew has described a somewhat similar phenomenon. It consists in immediate dorsal flexion of the foot and toes when the foot is pressed firmly downward; it is a single contraction, not a clonus as described by Sittig.

Sensory Disturbances. Henry Head³ has applied the observations he has made concerning sensation to diagnosis, and in a series of lectures shows how important sensory changes may be. His work has extended over a period of ten years. For clinical purposes, cotton wool may be used to test tactile sensation, but it should not be used over hairy parts. Painful pressure may be tested with a blunt point, such as that of a pencil holder and hard enough to produce pain over a normal part. The power of recognizing the vibrating tuning fork is a distinctive function of deep sensibility in lesions of the peripheral nervous system, and a valuable means of investigating the condition of the posterior columns in disease of the spinal cord.

¹ *Revue Neurologique*, February 28, 1913, p. 262.

² *Neurologisches Centralblatt*, January 16, 1913, No. 2, p. 87.

³ *Clinical Journal*, 1912, vol. xl.

The sensory functions of the peripheral nerves fall into three groups, which may vary independently of one another.

1. Deep sensibility, due to afferent fibers which run with the nerves of muscles and tendons: So long as these fibers are intact, the patient will be able to appreciate a pressure touch and the vibrations of a tuning fork. He can recognize the position into which the affected parts are moved passively, and, if pressure be sufficiently severe, it will arouse discomfort, even though the skin be totally analgesic. The condition of deep sensibility varies independently of that of the skin. Thus, of two cases in which the median nerve has been divided, in the one deep sensibility may be lost over the terminal phalanges of the index and middle fingers, while in the other it may be entirely unaffected, the difference depending on whether the tendons have been divided or not. Most mixed nerves carry the fibers from deep structures, and when such a nerve as the ulnar is divided, slight loss of deep sensibility can nearly always be discovered in the little finger, although no tendons have been injured.

2. Cutaneous tactile sensibility: The loss of this form of tactile sensation closely resembles in most cases the extent assigned to the injured nerve.

3. Cutaneous sensibility to painful stimulation such as that of a prick: The extent of the analgesia of the skin produced by division of a peripheral nerve bears no constant relation to the loss of cutaneous touch. The overlapping of those fibers which subserve sensibility to pain is much greater, at least on the hand, than that of the nerves of cutaneous touch.

So long as we have to deal with a peripheral lesion which is distal, that is, where the lesion is near the hand or foot, so long will the extent of the loss to cotton wool exceed the extent of the loss to prick. Whenever the lesion lies nearer to the central nervous system, these two become more nearly coterminous, and in lesion of the posterior roots the loss of sensation to prick exceeds the loss of sensation to cotton wool.

The nearer the lesion is to the central nervous system, the more extensive is the loss to prick sensation; the nearer to the periphery, the greater is the loss to cutaneous touch. In this way a diagnosis of the position of the lesion can be made by noticing the relation between the extent of the loss to cotton wool and the loss to prick.

It is difficult to determine with certainty at what period after union of a nerve deep sensibility is restored, but, roughly speaking, about one hundred days are required, if the injury be at the wrist, before pressure touch can be appreciated and passive movement recognized. When the structures at the wrist have been divided, it is not uncommon for the surgeon to unite the tendons and to forget to suture the nerve. Deep sensibility then returns to the fingers in about one hundred days,

but the skin remains entirely insensitive to cotton wool and to prick. If the skin still remains entirely analgesic after another forty days, we can be certain that though the tendons have been united, the nerves are still divided.

The manner in which cutaneous sensibility is restored depends entirely on whether the nerve has been structurally divided or functionally interrupted, and the order followed by the return of sensation to the skin is of much diagnostic and prognostic importance.

When a peripheral nerve has not been divided, but has lost its functional continuity in consequence of injury, sensation is restored in a different manner. The accident may produce a condition at first indistinguishable from that which would be caused by complete division of the nerve; but after a period, which varies with the severity of the injury, sensibility to prick and to cotton wool return together step by step. When a nerve has been reunited after complete division, protopathic sensibility is rapidly restored. The extent of the area insensitive to cotton wool still corresponds to that assigned by anatomists to the supply of the injured nerve, but the whole of this portion becomes sensitive to prick, and a prick "hurts more" than over normal parts, but the sensation is not so "plain." The prick "tingles" and seems to spread widely over the affected area. Cold below about 20° C. and heat above about 40° C., the so-called extremes of temperature, can be appreciated within this area. This protopathic reaction signalizes the first stage in recovery of a divided nerve, and yet Head has several times seen nerves explored, because the condition described was attributed to neuritis or irritation of the stump.

Later epicritic sensibility is restored so that the part becomes sensitive to light touches, to intermediate degrees of warmth, and to the size, shape, or pointed nature of the stimulating object.

Head believes that in the spinal cord the impulses underlying sensations of pain, heat, and cold become regrouped according to quality, and pass rapidly across the cord to ascend in the opposite half to that by which they entered the central nervous system. Those impulses which are associated with the appreciation of posture, size, shape, weight, and vibration continue on the same side of the cord in the posterior columns until they reach the nuclei of these columns in the medulla oblongata.

Unilateral Hypertrophy. ACROMEGALY. Enlargement and diminution of one-half of the body or of a part of the body are conditions not well understood. The studies devoted to the pituitary body have demonstrated that disease of this gland may cause gigantism, but as yet unilateral hypertrophy has not been shown to be dependent upon the pituitary body. A recent case of hypertrophy has been reported by Peter Bassoe.¹ There was no similar condition in the family. The

¹ American Journal of Insanity, July, 1912.

child, a boy, was noticed at birth to be larger throughout the entire left side. His health was good and the only disturbance caused by the abnormal development at the age of sixteen years was the mechanical inconvenience of having one leg longer than the other. Both feet were enlarged, and naevi were found in the back of the trunk. Bassoe discussed the possibility of acromegaly but was convinced that the resemblance to this disease was only superficial. Acromegaly is an acquired condition and the boy did not present the features of this disease. The sella turcica was not enlarged. He regarded the case as one of congenital deformity, a hyperplasia or overgrowth of the entire left side with additional overgrowth of the right foot. It was evident that the condition was not one of hypoplasia of the right side on account of the enlargement of the left cheek, gums, and teeth, and the marked nevoid condition of the skin. Bassoe referred to a number of similar cases in the literature, and, in many, nevoid conditions have occurred.

Dysbasia Lordotica Progressiva. There is a temptation to classify unusual functional disturbances of the nervous system which are not clearly understood under the heading of hysteria, and we may welcome, therefore, the attempt to put apart a group of spasms affecting different parts of the body as a disorder to be regarded as distinct from hysteria, even though at present we know little or nothing of the etiology of these spasms. Oppenheim suggested the name of *Dystonia musculorum deformans* or *Dysbasia lordotica progressiva*. Bregman¹ has recently reported two or three cases belonging to this class. He states, regarding this subject, that there is a special form of hyperkinesia beginning in later childhood or the period of puberty, manifesting itself as tonic and clonic spasms and causing remarkable positions of the limbs. The spasms usually begin in a lower limb, seldom in an upper or both limbs of one side. The location of the spasms may vary later in the course of the disease; in many cases the limbs of one side are more affected, in other cases the upper extremity of one side and the lower extremity of the other are the parts chiefly implicated. The muscles concerned in locomotion are usually the most involved. The spasms vary in character, they may appear as tremor, but more commonly as arrhythmic tonic and clonic movements of single muscles or groups of muscles, incoördinate and unlike those of volition, often resembling those of chorea. Rarely are the contractions of a voluntary purposeful character. They vary in intensity, and become stronger in standing, walking, and under observation. This hyperkinesia cannot be identified with any of the known forms, such as chorea, *maladie des tics*, or *athetosis*. The disorder may be diagnosed when spasms of the lower leg and foot muscles develop gradually, causing contractures usually as foot-drop, in a youthful

¹ *Neurologisches Centralblatt*, July 16, 1912, p. 885.

person otherwise healthy and presenting no signs of hysteria. The disorder as yet has been seen only in those of Jewish origin. In some instances, a neuropathic disposition exists. The prognosis is unfavorable, the disorder is usually progressive, and treatment has proved of little value. No pathology is known, and in the single case with necropsy (Ziehen) recorded nothing important was discovered.

In my digest of last year in PROGRESSIVE MEDICINE I gave briefly the chief symptoms of this extraordinary disorder of motion described by Oppenheim, but it may be well to recall them as they are described in the paper on the subject by Joseph Fränkel.¹ It has seemed to different authors to be peculiar to the Jewish race and consists, as Fränkel says, of (1) a deformity around the pelvis, and (2) of tonic and clonic myospasms of the musculature about the pelvic girdle associated or not with similar twitchings of other muscles. The commencement frequently is with slight symptoms in the upper extremities; but the lower are permanently and severely affected, namely, the musculature of the thighs, pelvis, and lumbar part of the vertebral column. Most of the symptoms disappear in the reclining position, except a variable degree of deformity around the pelvis. Attempts to stand, particularly to walk, increase the deformity. A marked lordosis of the lower thoracic and upper lumbar parts of the vertebral column, with inclination of the pelvis and especially prominence of the buttocks, seems to be characteristic of the condition. The gait is bizarre, resembling the locomotion of a quadruped, and is described as "monkey gait" or "dromedary gait." The condition has been regarded by some as hysterical, but this diagnosis manifestly is incorrect. During locomotion the attitude changes continuously, becoming clownish in character; the patient soon shows evidence of strain, the face flushes, the pulse rate is increased, and profuse perspiration sets in. The upper extremities are less implicated than the lower. Signs of organic nervous disease are absent. Variations in the tendon reflexes are noted, but they are transient and not invariably present. Oppenheim believes the condition has an organic basis, and is a disturbance of the coördination of muscle tone. The etiology of the disorder is unknown, the disease runs a chronic progressive course, and treatment has no influence, although transient benefit is possible. Fränkel reports 4 cases of this unusual and extraordinary disorder, 1 case occurred in a Christian, and this would show that the condition is not confined to the Jewish race. In Fränkel's first case, considerable improvement was obtained by methods of training muscular action. The condition has been named *tortipelvis* by Fränkel, and the name is not a bad one when one considers the analogy with essential torticollis. Fränkel believes the future will show that there may be a symptomatic as well as an essential variety. Malaria was noticed in 2 of his cases and traumatism

¹ Journal of Nervous and Mental Disease, June, 1912, p. 361.

in 2. In 1 of his cases, a hereditary factor was elicited; hysterical paralysis in the father and tic in an uncle. Apparently the disease develops upon a "tic," "spasmophile" soil, precipitated by various provocative causes. Fränkel believes that at present it is safest to classify the condition among the tics and spasmophilias, and to individualize it by the name *tortipelvis*. There is much to be said in favor of this view, chiefly because of the remarkable improvement obtained in one of his cases.

Muscular Dystrophy. It seems strange that during the long period of years in which muscular dystrophy has been studied and written about no one until the present time has recorded a case of unilateral involvement. Mingazzini¹ now reports a case which fills this gap. His patient was a young man who, at about the age of five years, after a traumatism, began to show the symptoms of the disease confined to the right side of his body, viz., a gradually developing atrophy. Electrical reaction was diminished in the affected muscles and even lost in those most atrophied. The slow extension and the topography of the atrophy and the absence of sensory disturbances permit the elimination of a chronic meningeal disorder, polyneuritis, chronic or acute poliomyelitis, and syringomyelia. The symptoms had existed in this case about thirteen years, but at the time of examination there was a suspicion of atrophy in the muscles of the left shoulder.

PERIPHERAL TYPE OF MUSCULAR DYSTROPHY. Cottin and Naville² describe a purely clinical case which they regard as one of myopathy of the peripheral type. They could find references to the peripheral type only in the cases of Oppenheim and Cassirer, Dejerine and Thomas, and Gowers. They make no mention of the case with necropsy reported by me. In these cases referred to by them, the onset of the paralysis and atrophy was invariably in the extensors of the thumb and fingers in the upper limbs, and in the anterior tibial and extensors of the toes in the lower limbs. Only secondarily and in less degree, and often very slowly, does the paralysis affect the interosseous muscles of the hands and the thenar and hypothenar eminences; and, in the lower limbs, the two peroneal muscles and plantar flexors of the toes and feet.

Peripheral myopathy in the hand has not the same location as the Aran-Duchenne atrophy at the beginning of the disease. In the peripheral myopathy, the hands fall and the fingers are flexed, and atrophy appears later, whereas atrophy is always early in the Aran-Duchenne form, and does not affect the extensors of the thumb and fingers until late. Peripheral myopathy, like the juvenile form, affects especially the extensors.

Relying on three cases (they make little use of Gowers' case) these

¹ Nouvelle Iconographie de la Salpêtrière, July and August, 1912, No. 4, p. 320.

² L'Encephale, May 10, 1912, p. 401.

authors conclude that peripheral myopathy begins late (middle life), is not hereditary nor familial, and is more common in females. In my case, it began about the age of twenty-six years, and was in a male. In Gowers' case, it began at the age of ten or twelve years. In myopathic families, females are affected later than males and less severely, or even escape. The frequency of the peripheral myopathy in women affords a contrast to the rarity in women of the Aran-Duchenne and Charcot-Marie-Tooth types of atrophy, in which the location and time of onset are much the same. These conclusions are unreliable because only three cases are employed, my own was in a male, and in the reported cases, therefore, the sexes were more equally divided.

These authors attempt to explain the localization of the various forms of myopathy. They agree with the statement of Mme. Sacara-Tulbure¹ that the disease is manifested in the muscles which are most vulnerable at the time of its onset. This vulnerability depends in part on the fatigue to which a muscle is subjected, and for that reason the extensors are most affected as in man they resist the attitude of flexion which weight gives to the joints; it depends in part on the phylogenetic or ontogenetic development of the muscle, on its adaptability to its function at the time of onset of the disease.

In the young child, myopathy attacks first the muscles necessary for the erect station (the muscles of the back, buttocks, thighs, and calf), as these are exposed to great fatigue and are not sufficiently adapted to their function at the onset of the myopathy. When the disease appears first in adolescence (Erb's type), those muscles are affected which attach the upper limb to the trunk, because the function of those muscles, which are more peculiar to man and are of later phylogenetic development, is not at that period sufficiently assured. When myopathy appears late, when there is little predisposition to the disease, it affects at first only the muscles most peculiar to man and the latest in phylogenetic development, viz., the muscles of the fingers and wrists, and begins in those most easily exhausted, the extensors. The same explanation applies to the different localization of the atrophy in the Werdnig-Hoffmann and Aran-Duchenne types.

It is questionable whether a new type of disease can be well established on a basis of 4 cases as Cottin and Naville attempt to do for the peripheral type of myopathy. If my case with necropsy had been included by these writers they would have had a basis of 5 cases. It would then be impossible to assert that the peripheral type begins in middle life, as in Gowers' case the symptoms began at the age of ten or twelve years, and in mine about the age of twenty-six years. Neither could they assert that the type is more common in females, as in 2 it occurred in males in so small a number as 5 cases. Although the peripheral type does not appear to have been hereditary or familial

¹ *Revue de Médecine*, 1894.

in the cases observed, the small number does not permit the conclusion that this type is not hereditary nor familial. It probably would not be difficult to observe in many clinics 5 cases of any type of muscular dystrophy that were neither familial nor hereditary. For the present we probably shall serve the purposes of science better if we refrain from making too sharp limitations to peripheral myopathy.

Myotonia Atrophica is receiving much attention at the present time, and its relation to myopathy and to Thomsen's disease is not as yet fully determined. Hoffmann and Noguès and Sirol, who described the disease, believed there was nothing characteristic in the atrophy. Steinert, in 1909, on a basis of 7 cases of his own and on those he found in the literature, attempted to make a distinct type. It consists of the facies myopathica, with atrophy of some of the muscles of mastication and of the sternocleidomastoid muscles; of atrophy of some of the forearm and hand muscles (the extensors more frequently than the flexors), especially of the supinator longus; and of atrophy of the muscles of the leg below the knee, especially the peroneal group; but atrophy of the lower limbs is much less common than of the other parts mentioned. In all the cases in which a satisfactory history could be obtained, the atrophy began in the forearm and hand muscles and later affected the face.

Curschmann¹ reports six cases of myotonia atrophica with a careful analysis of their symptoms. The myotonic disturbance was the first sign in 4 cases, then came disturbance of speech, and then appeared paresis and atrophy of the muscles. Ataxic gait was seen in 3 of the cases. Vasomotor and intestinal symptoms were present in some of the cases. The muscles of the shoulder girdle, thorax, and back were intact in all 4 cases.

Curschmann believes myotonia atrophica should be regarded as distinct from Thomsen's disease, because the former has a later commencement (in his cases between the twentieth and thirtieth years, and even at the fortieth year); it is not so likely to be familial, and when it occurs in families has always the same type, and the real Thomsen type is not found in the same family, because in myotonia atrophica only a few muscles show active myotonic disturbance, but the same muscles are affected in the different cases (those concerned in making a fist and subjectively the tongue; the muscles of the lower limbs are less likely to show myotonic disturbance), and because only a few muscles show mechanical and electrical myotonic reaction.

It does not follow that the muscles which present myotonic reaction will also atrophy, as demonstrated especially by the tongue.

In the Steinert type, the whole body appears poorly developed, atrophic, the fat is much reduced, and the appearance is very different from that of the athletic figure in Thomsen's disease. Loss of the hair

¹ Deutsch. Zeitschrift f. Nervenheilkunde, vol. xlv, No. 3, p. 161.

of the head and atrophy of the sexual organs are common in the Steinert type, and the tendon reflexes are usually lost.

Curschmann believes myotonia atrophica may be caused by auto-intoxication from disturbance of the internal secretions.

Periodic Family Paralysis. This extraordinary disease seems to be more common in America than in England, if we may judge by the greater number of cases reported by American writers. H. Willoughby Gardner¹ found only 4 cases in the literature of Great Britain, and adds another to the list. His case was peculiar in that no other members of the patient's family had the disease. The attacks of paralysis seem to have replaced previous attacks of "bilious headache," and either the attacks themselves or the warnings thereof seem nearly always to have begun on Sunday. When the patient was first seen the attacks were occurring at ever decreasing intervals, and were becoming more severe and more prolonged. Treatment seemed to be very successful. The frequent occurrence of the attacks on Sunday was attributed to some unaccustomed and violent exercise, such as a football match, or a particularly rich and indigestible supper, such as sausages, or a combination of both on the Saturday half holiday. All the attacks developed during sleep. The patient would wake up and find himself paralyzed; in some instances he was able, by getting up and walking about, to throw off the attack, though generally it would come on again with increased intensity a few hours later.

Periodic paralysis is not only a family disease, but it is also hereditary. Gardner compares it with epilepsy, migraine, and gout. Epilepsy resembles it in that the attacks are periodic and tend to appear more and more frequently if their occurrence is not checked by treatment, and they tend in the long run to produce a gradual deterioration of the brain. He believes the essential condition underlying periodic paralysis is some congenital fault of metabolism. Ophthalmoplegic migraine resembles periodic paralysis in that the attacks are periodic in their occurrence, and tend to appear at more and more diminished intervals; they are almost invariably associated with headache, often like ordinary migraine, they are accompanied by a form of paralysis which is temporary and at first disappears completely between the attacks, but as a consequence of repeated attacks some paresis may persist during the interval. This has happened in some of the cases of periodic paralysis, though the onset of permanent paralysis was much slower in these cases than in ophthalmoplegic migraine. Cases of periodic ophthalmoplegia without headache have been reported. Ophthalmoplegic migraine, like periodic paralysis, is to a certain extent amenable to treatment. Gardner refers to one of his cases in which the attacks ceased while the patient was under treatment in the hospital for an intercurrent affection, and the paresis of the muscles

¹ Brain, 1913, vol. xxxv, Part 3, p. 243.

affected, which had persisted between the attacks, almost entirely cleared up. After the man returned to his home, the attacks recurred, and soon became as severe as they previously were.

Gardner believes the attacks of periodic paralysis are caused by auto-intoxication because of the many points of resemblance to other conditions which undoubtedly are due to this; because of the sudden onset and rapid recovery, the invariable occurrence of the phenomena after sleep, when waste and toxic products may be assumed to accumulate, just at the time that intestinal digestion is taking place; because the condition may occasionally disappear after walking, the symmetrical distribution of the paralysis, the occurrence of headache, drowsiness, thirst, anorexia, aching of the limbs, and sweating during the attacks. These toxic symptoms resemble those which occur in other transitory toxemias. Because previous attacks of headache, probably toxic, may be replaced by attacks of paralysis, because of the high specific gravity of the urine passed during the attacks, and the presence in it of small quantities of indican, because of high pulse tension with accentuated aortic second sound and slow pulse in the initial stages, and the cardiac dilatation which rapidly follows. In view of these facts, Gardner ordered his patient to give up drinking beer and to avoid all rich food, and to drink large quantities of water, to take 1 dram of magnesium sulphate in half a pint of hot water on rising every morning; to take a 2-gr. calomel pill once a fortnight at bedtime, followed by Epsom salts in the morning; to take tinc. digitalis, ℥iv; potassium acetate, gr. xx; syrup, ℥ss; aq. menth. pip. ℥j three times a day as a diuretic; to take caffein citrate, gr. viiss; potassium bromide, gr. x; acid hydrobromic dil., ℥xv; syrup, ℥ss; aq. chloroform, ℥ss in a tumblerful of water, whenever any warning symptoms of an attack made their appearance. The caffein acted as a diuretic and cardiac stimulant. The success of this treatment exceeded Gardner's hopes. The attacks which had been getting more and more frequent, and threatened to incapacitate the patient, at once ceased. It was two years before the man had another attack; once or twice warning symptoms occurred, but a dose of the caffein mixture proved sufficient to avert the attack. Then came an attack after a hard game of football. The man was told to take his calomel pills and a dose of his caffein mixture, and to eat a light supper and drink no beer but much water after a football match in the future. As long as he did this he played football matches with impunity. Then without Gardner's wish the man discontinued all treatment and drank beer again. This was a control experiment. The attacks recurred, and threatened to become more frequent. If Gardner's hypothesis of an underlying congenital fault of metabolism be correct, the attacks would be expected to return on the resumption of the old conditions of life, as Gardner states, and this is what actually happened.

Paralysis Agitans beginning early in life is very rare, and therefore Krukowski's¹ case is worthy of report. The disease, in his case, began in the twenty-first year of life. It developed slowly and the tremor implicated gradually all the limbs. The patient was a woman and had been previously healthy. The rigidity of the muscles, the retropulsion, propulsion, and lateropulsion, the characteristic position, the mask-like countenance, and especially the tremor gave a typical picture.

Hysteria and multiple sclerosis may cause symptoms suggesting paralysis agitans, but these conditions Krukowski felt he could exclude in his case.

PERFORATING ULCER IN PARALYSIS AGITANS. We are accustomed to make a diagnosis of tabes when perforating ulcer develops, and do not regard it as a condition likely to occur in paralysis agitans. Apert and Rouillard² have observed a perforating ulcer in the palmar surface of the hand occurring in a case of paralysis agitans. Their patient had contracted syphilis, but had neither tabes nor diabetes.

Intermittent Lameness with Polyneuritis. The case of intermittent lameness reported by Starker³ is interesting because muscular atrophy, partial reaction of degeneration, disturbances of sensation, loss of patellar and Achilles tendon reflexes, and pain indicated the presence of polyneuritis. This author thinks, from a study of the cases in the literature, that a combination of the two disorders cannot be so very rare. Their interrelation is not so easy to determine.

It seems probable that the case of intermittent claudication confined to the upper limbs, reported by E. M. Williams,⁴ may have been one in which neuritis caused some of the symptoms.

Myoclonia. An unusual case of this disorder in which the contractions occurred only after rest or sleep has been put on record by L. Pierce Clark.⁵ When the boy was aged four years it was found that when he attempted to walk, after a prolonged rest, either with or without sleeping, all the voluntary muscles of the trunk and extremities underwent arrhythmic and asymmetrical contractions which he was unable to control; the violence of the muscular contractions frequently threw him to the ground. The attacks were wrongly considered a phase of Jacksonian epilepsy. They lasted a few seconds only, were most intense at the beginning, and the contractions gradually ceased as the boy seemed to exert his will in their control. Even the face was said to have been involved. The proximal muscles of the thighs and arms were most affected. The child was always conscious in the attacks. In time, by a trick of stepping about briskly on attempting

¹ *Neurologisches Centralblatt*, November 16, 1912, p. 1427.

² *Revue Neurologique*, November 30, 1912, p. 585.

³ *Deutsch. Zeitschrift f. Nervenheilkunde*, vol. xlv, No. 1, p. 52.

⁴ *Journal of Nervous and Mental Disease*, 1912, p. 306.

⁵ *Journal of the American Medical Association*, June 1, 1912, p. 1666.

to stand or walk, he was able to disguise in part the contractions, and gradually gained more control over the large contractions. He never had an attack in sleep, although when he turned over in bed or greatly shifted the position of his body the contractions were sure to occur with great violence. Some of the attacks were witnessed by Clark. The patient, then a man, aged twenty-four years, about 2.15 A.M., in turning while asleep, from the left side on which he had been quietly sleeping, developed the twitchings. They began with quick clonic contractions, arrhythmic and asynergic, in the muscles of the neck, trunk, and limbs. At times there was only slight fibrillary tremor in the larger muscles, and at other times the mass movements of muscle play were sufficient to twist the body about as though he were wrestling with an unseen adversary. The contractions were like those seen in ordinary myoclonia. The attacks ended by a gradual subsidence of range and frequency of clonic spasms. Prolonged rest or exercise altered little the severity and frequency of the attacks.

Clark refers to some cases in literature presenting similar phenomena. In a total of 26 cases of myoclonia, 16 had positive data regarding the contractions during sleep, and of this number 7 are recorded as showing a cessation of the myoclonus in sleep, while 9 cases showed some myoclonus during sleep or reappearing on or during waking. Clark makes mention of these facts to show that, contrary to the general opinion, myoclonic contractions may, and indeed often do, occur during sleep or partial waking, and also that together with many of its allied states of the spasmophilic group such as ties and habit spasms, the condition is dependent on physiological alteration of muscle tone, which in the last analysis is intimately associated with the function of the cerebral cortex. There is marked diminution of the muscle-tonus during rest or sleep. When myoclonic persons awake, in Clark's opinion, this wave or nerve impulse flows into the terminal muscle apparatus, which in turn responds in an irritable manner to the abnormal or excess impulse, and clonic spasm occurs. The perturbing spasm is continued until the reciprocating cortical centres and the muscles controlled by them are equilibrated or balanced; then, and then only, does rest or proper control of the normal waking tension of the neuromuscular system take place.

PROGRESSIVE MYOTONUS IN A MYOCLONIC PATIENT. This case reported by Purves Stewart¹ is unusual in that tonic contractions occurred in some muscles and clonic contractions in others in the same person. Myoclonia existed in the family to which the girl belonged. She herself had myoclonia, but in addition the right shoulder was elevated, the upper fibers of the trapezius were in tonic contraction, and the scapula was rotated so that its vertebral border inclined from

¹ *Neurologisches Centralblatt*, March 1, 1913, p. 288.

below upward and outward. The lower part of the scapula was 4 cm. from the thorax. This winged condition of the scapula was not from paralysis, and the trapezius, serratus magnus, and other muscles reacted to the electric current normally. When the upper limb was raised to a horizontal position the deformity disappeared. Muscular dystrophy had been diagnosticated, but this diagnosis could not be accepted, as there were no atrophy and no electrical changes, and because the deformity disappeared on voluntary movement and was unilateral.

Pellagra. The study of pellagra in America has been carried on only during a few years, and yet much interest has been aroused within that period in this peculiar disease. It is more common in the Southern States, but is not confined to these States. Bondurant,¹ living in Alabama, was able to study about 50 cases, and, in this number, 5 presented symptoms strongly suggesting parietic dementia. He believes that the somatic symptomatology of pellagrous paresis is almost identical with that of classic general paresis. The exaggerated deep reflexes, fibrillary tremors, speech defects, muscular weakness, incoördination and spasticity are typically present as in most cases of paresis. One of the cases described by Bondurant illustrated the tabetic form of pellagrous pseudoparesis, with atrophy, muscular incoördination, pains in the legs, abolished knee-jerks, and sensory changes. In all the cases the essential mental state was dementia. In the emotional disorders, the resemblance between the true general paresis of syphilitic etiology and the pseudoparesis of pellagra is less noticeable. The pellagrous parietic, says Bondurant, is introspective, neurasthenic, and despondent, lacking the sense of well being, emotional exaltation, and grandiose delusional phenomena of the common form of true parietic dementia. The resemblances between syphilitic and pellagrous paresis are sufficiently close to offer at times a real problem in diagnosis, with likelihood of error in event the possibility of a pellagrous etiology of these cases be not kept in mind.

Graves' Disease. The acute form of this disease sometimes is not recognized, and therefore Schlesinger's² paper is timely in that it enables us to become familiar with certain symptoms. Emaciation is one of the most pronounced signs, and it may be of rapid development and great intensity, and should suggest Graves' disease before neoplasm is considered. Swelling of the spleen is common, and, as a rule, is slight, but may be great so that pseudoleukemia or typhoid appears to be present. Fever may occur, and may be continual or intermittent. The condition of the thyroid gland may be different from that of chronic Graves' disease. The gland may not be swollen, and may even appear smaller than normal. Vascular murmurs may be heard

¹ Journal of Nervous and Mental Disease, November, 1912, p. 734.

² Therapie der Gegenwart, November, 1912.

on auscultation over the gland. Schlesinger considers the vascular struma peculiar to Graves' disease. The ocular phenomena may be very indistinct. Tachycardia is usually a sign. The white corpuscles in the blood are diminished in number, especially the polynuclears. Diarrhea is frequent, and jaundice occurs occasionally. There may be glycosuria. Anyone who has acute Graves' disease is much less resistant to infection, and is not a suitable subject for an operation.

Angioneurotic Edema. That angioneurotic edema under certain conditions may be brought to an end immediately after the injection of salvarsan has been shown by the report of a case by Burr.¹ The patient, a man, had developed an inability to take mercury, or at least he believed he had, shown by swelling of the tongue so great as to cause a fear of choking a few hours after the mercury had been given. The same result followed the use of Fowler's solution by mouth in two- and three-drop doses, iodide of potassium and several other drugs. Burr made a test of mercury, he ordered an inunction of mercury to be given at 4.30 p.m. At 1.30 the next morning one side of the tongue began to swell and then the other side swelled, until the tongue could not be contained within the mouth. The gums were not swollen and did not bleed. The patient was panic-stricken, and though there was no real dyspnea, he feared he would choke to death. In about six hours the swelling had all gone, and it decreased rapidly after it began to lessen. The man was syphilitic. After further observation, Burr concluded that the case was one of angioneurotic edema, and that mercury had nothing to do with its causation. Rapid improvement occurred after intravenous injections of salvarsan, although arsenic by the mouth had been useless. The salvarsan in this case was effective in the treatment of syphilitic symptoms where mercury had failed.

¹ Journal of Nervous and Mental Disease, July, 1912, p. 456.

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